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Amateur Radio

CQ

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JUNE 1997

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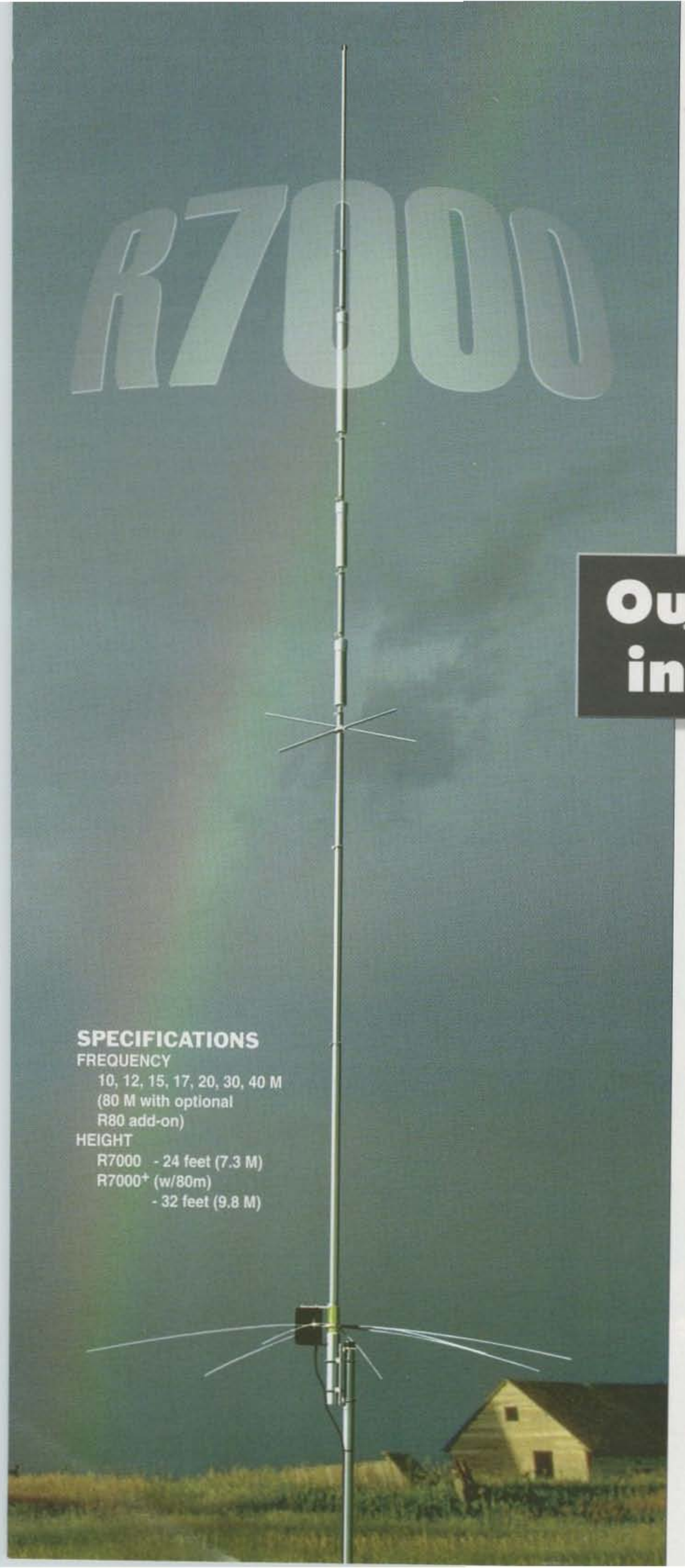
THE RADIO AMATEUR'S JOURNAL



SPECIFICATIONS

FREQUENCY
10, 12, 15, 17, 20, 30, 40 M
(80 M with optional
R80 add-on)

HEIGHT
R7000 - 24 feet (7.3 M)
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10, 12, 15, 17, 20, 30, 40 Mete

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AN EDITORIAL

As I write this, a week or so after the ides of April and as the specter of the IRS abates, I have begun to reflect on the absurdities that have replaced reason. Most of these involve a fair amount of paranoia, a liberal dose of conspiracy theories, and a tremendous amount of unsubstantiated information generated as truth or at the very least distinct possibility. This combination of basic fluff seems to infuse people with a feeling that they know what's going on (at all times), and how to correct it, how to guard against it, how to protect others, and how to defend and uphold a ubiquitous moral fiber.

My conspiracy theory started to coalesce when I read a piece about the Heaven's Gate tragedy which presented a tenuous connection with amateur radio. It was alleged that a caller to Art Bell's (W6OBB) all-night radio program "Coast To Coast AM" might have precipitated the event by a discussion of a possible object trailing behind the now extremely famous Hale-Bopp comet. Somehow the thought of 39 lost souls zooming along, enjoying a little bag of salted peanuts, two cocktails, or a hot beverage of their choice as the firmament zips by all being the result of listening to one radio program is a little hard to accept. For Art Bell or the caller to assume responsibility for the sad event would be the height of self-imposed omniscience. The 39 did what they did, right or wrong, for reasons generated long before the radio program, and more than likely without the benefit of amateur radio.

Well, I started to think about some of the other strange things that were happening during April and that to my mind defied logic. The U.S. Patent Office, in an effort to streamline, is proposing a new system whereby a person who devotes countless hours, money, and expertise to invent something will now become a benefactor to other businesses throughout the world. The new system would require the applicant to publish the complete details of the new invention or process apparently prior (due to bureaucratic time involved) to any patent being issued. It therefore seems that any company any place in the world can pick up and use your invention or process without even having to say thank you, much less pay for it. I guess it makes sense to someone.

Several days before the dreaded tax day, April 15th, the newspapers all ran special articles on the geographic breakdown for IRS audits. If you happened to see this and live in an area that was almost never audited, you probably wouldn't have been tempted to change your return to take advantage of the information. I know that most people are honest and wouldn't think of this information as being handed a wondrous, bountiful gift. It would have been slightly more logical, though, to run the information after April 15th.

Next was the disclosure that the FBI labs were not quite as reliable as we may have thought. They too relied on their reputation to generate intimidation, if you will, instead of the data they were supposed to generate. What they did generate is now up for grabs and specious. I guess this is a good time to be a lawyer. It's beginning to seem that all of our hallowed institutions may be like the emperor and have no clothes on or be run by a committee of the lowest common denominator.

Closer to home, here in New York, we had the mayor of New York City threaten to convert the UN complex into condos and tow away all of the diplomatic cars unless the diplomats paid their traffic fines. Well, diplomatic immunity is immunity and applies to our people overseas as well. It's not up to the mayor to circumvent the State Department. It doesn't make too much sense for the City of New York to continually spend probably around $1,000,000 a year to generate all of the unpaid tickets when they know they won't be paid. Immunity is immunity. On the other hand, as of now most people who use the Internet to take part in the lottery in Leichtenstein (HBØ) are technically immune from gambling laws here. Through the wizardry of electronics, although you may be comfortably sitting at home, technically and legally you are gambling in Leichtenstein and therefore you are subject to their laws, not ours. Amazing.

By now most of us are aware of efforts by the ARRL to improve FCC enforcement procedures. Here is an area where a group is asking for more control by the government (and rightly so) when many people and politicians are decrying too much government control. While it is obvious and somewhat serious to to leave amateurs with the feeling that very little that goes on within amateur radio is actually under FCC scrutiny and control, that is what is in effect as of now. The systems in place and the resources available to the FCC preclude any meaningful enforcement of amateur rules. As much as they would like to, it is virtually impossible to accomplish under the present system. In a way it's the same thing as telling people on April 15th that there is little or no chance of being audited by the IRS. By the way, one of the last things the IRS wants to talk about is their super-duper computer tax program, which as reported has a number of problems.

There are tons of legislation being brought forward now to try to control a lot of the above, and so far everything seems to be introducing more and more problems, including the means and ways of enforcement. Yet somehow, another unenforceable law is supposed to change everything.

Another item I found bizarre was all of the conspiracy theories after the disappearance of the Air Force A-10 over Colorado. Somehow it was going to refuel and bomb a civilian target on the anniversary of another tragic event to send a "message." It does quite a disservice to the captain who lost his life in an unfortunate accident. As of this writing, wreckage apparently has been located, and so all of the conspiratorial mavens can rest easy for a while. It may be that knowledge is power, but for the most part we're talking about supposition, paranoia, and the potential for that fifteen minutes of fame.

While only part of this has to do with amateur radio, the basic principles are the same. We seem or want to imbue all sorts of institutions, such as the government and the ARRL, with immense power, inscrutable foresight, and the ability to leap tall buildings with a single bound. We confer divinely inspired altruistic motives, almost to the point of infallibility, to these institutions and to those who serve us under their aegis. By extension, then, any type of flaw must be a conspiracy, because these people know what they're doing at all times, and there must be a reason for their action that's covering up something else. Sometimes these "conspiracies" are simply mistakes, ineptness, egocentric behavior, or just plain ignorance. I guess we all would like to believe that our hallowed institutions are run by people of impeccable repute who are naturally brilliant, insightful, well-educated, and experienced, plus favored with unlimited resources and logistics so as to positively accomplish any and all tasks. I think the only representation of that typically can be found in movies or a Tom Clancy novel. The outcome can be tailored to fit a preconceived plot wherein everything works out fine. The only problem there is that it doesn't readily transfer to real life.

We all draw what we perceive as strengths and a sense of well being from our memberships in affinity groups, and we like to believe the best of those who guide and shepherd our interests and welfare. Sometimes they're just as silly, absurd, and yes, malevolent as some of us are. I guess in some ways it's better to be thought of as part of a conspiracy rather than simply as ignorant. Either way, it's still better than zooming along watching the in-flight movie next to Hale-Bopp.

The only conspiracy within amateur radio is the one to have a good time. Okay, it may not be that much fun if someone moves next door with a few monobanders and a couple of KW, but the object that we wish for ourselves and others is fun, a good time, and a sense of accomplishment. How we do it is our choice, not via some means dictated by "those who know." The bizarre, the silly, and even the stupid will be with us forever. A good part of getting through life, and enjoying amateur radio, is having an active sense of humor. April wound up with a handful of Texans holding hundreds of police at bay. The dissident Texans want to secede from the United States via a national referendum. If some radio talk show host speaks to them, I hope he's not an amateur. Maybe if he belonged to the Rotary or Elks, those groups might enjoy a vicarious connection, too.

73, Alan, K2EEK

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ANNOUNCEMENTS

• **CM93** – CM93 will be activated during the June ARRL VHF QSO Party, June 14–15. CM93 is a rare grid located in the Santa Barbara Channel, in the area of Santa Rosa Island. Steve, KE6GOS, and Kip, KD6TBE, will be operating from Steve's boat, the *Skeleton Crew*. Operation will be on 6 and 2 meters, 440 MHz, 1.2 GHz SSB, and 220 meters FM only.

• **Community Preparedness Workshop** – The Disaster Emergency Response Association will be holding a community preparedness workshop at Asheville-Buncombe Community College in Asheville, North Carolina on July 17–18. The agenda and focus will be on disaster preparedness in communities throughout the southeastern U.S., Gulf States, and Caribbean. It will include discussions on family preparedness, business risk management, FEMA roles, etc. Registration fee is $79 if received by June 15. For more information, contact DERA Regional Workshop, P.O. Box 6558, Asheville, NC 28816; or check out their Web site at: <http://www.netcom.com/~n3dak/asheville. html>.

• **Field Day from Lynwood, California** – KA6CHP has been granted a permit for the use of Ham Park, Lynwood, Washington, for Field Day operations from 0800Z June 28 through 1800Z June 29. Any amateur with a valid license, and not necessarily a U.S. license, is invited. For more info, fax KA6CHP at 310-898-1383 (English/French/Spanish).

• **These Special Events are scheduled for June:**

W2RDX, Rochester, New York; Rochester DX Association; Field Day operation/celebration of the 50th anniversary of the association; June 28–29. For QSL, send SASEand QSL to Irv Goodman, AF2K, 515 Drumm Rd., Webster, NY 14580. (DX cards can be sent to the Bureau and will be returned via the Bureau.)

KY2F, from Oswego County Airport, Fulton, New York; Oswego County Amateur Radio Emergency Service (OCARES); during Young Eagles Day; June 14 from 1200–2100Z; operation in the lower half of the General 80, 40, 20, 15, and 10 meter phone bands. For certificate, send QSL and large SASE to KY2F, Box 5281, Oswego, NY 13126.

WO3C, from Wellsboro, Pennsylvania; Tioga County ARC; to promote amateur radio awareness; 1400Z June 21 through 1800Z June 22; operation on 3.860, 7.250, 14.250 and 28.375. For certificate and QSL, send QSL to Darlene Rahn, RR #6, Box 200, Wellsboro, PA 16901-8972.

W3DAD, from Laurel, Maryland; The Laurel, Maryland ARC; to celebrate Father's Day; June 15, 1200– 2400Z; operation in the lower portion of the General phone bands on 75, 40, 20, 15 meters, and 28.350 and 147.54 (simplex). For certificate, send QSL and SASE to LARC, P.O. Box 3039, Laurel, MD 20709.

VE3MIS, from 25th Streetsville Founders Bread and Honey Festival, Mississauga, Ontario, Canada; Mississauga ARC; 1300–2200Z June 7–8 ; operation on SSB 3.930, 7.230, 14.240, 18.130, 21.330, 24.940, and 28.340 MHz; SSB/CW 144.150–144.250 MHz, 446.100 MHz FM simplex. For QSL, send QSL and SASE to MARC, c/o Michael Brickell, 2801 Bucklepost Crescent, Mississauga, ON Canada L5N 1X6 (note: U.S. stamps cannot be used to send mail from Canada to the U.S.).

W4UOT, from historic Bell Buckle, Tennessee; The Middle Tennessee ARS (MTARS); to commemorate the 3rd Annual RC Cola & Moon Pie Festival; 1300–2100Z June 21; operation on or near 3.980, 7.240, or 14.238 MHz. For a color certificate, send 9×12 SASE to W4UOT, c/o Gerald Ewell, Sr., 809 Parks St., Manchester, TN 37355.

KY4X, from the Highland Games, Glasgow, Kentucky; 1400–2100Z June 7; operation on 20 and 40 meters General. For certificate, send 9 × 12 SASE and QSL to KY4X, P.O. Box 23, Summer Shade, KY 42166.

KB4ALC, Bowling Green, Kentucky; Western Kentucky DX Assn.; celebration of the 1997 Corvette Homecoming; 0000Z June 7 through 2400Z June 8; operation on 3.860, 7.235, 14.235, and 21.310. For certificate, send QSL to KB4ALC, Kenneth E. Newman, 505 Emmett Dr., Bowling Green, KY 42101.

W7AIA, from the Grand Re-opening of Pearson Air Museum and 60th anniversary of Russian Transpolar Flight, Vancouver, Washington; Clark County ARC; 1600–2400Z June 21 & 22; operation on the General phone sub-bands 80, 40, 20, 15 meters, and Novice/ Tech phone sub-band 10 meters. For certificate, send #10 SASE to CCARC, 4211, N.E. 140th Ave., Vancouver, WA 98682.

W8CWD, Steubenville, Ohio; Steubenville/ Weirton ARC; to commemorate Fort Steuben bicentennial; 1500–2200Z June 14 and 1500–2200Z June 15; operation on 7.270, 14.270, 28.470. For certificate, send QSL to Bill Leist, WA8DRL, 2444 Alexander Manor East, Steubenville, OH 43952.

WØSV/75, St. Cloud, Minnesota; St. Cloud ARC; to commemorate the club's 75th anniversary; 0000–2359Z June 7; operation CW 28.175, 21.175, 14.075, 7.125, 3.700, 1.875; and SSB 28.375, 21.375, 14.275, 7.275, 3.875, 1.975. For QSL and certificate, send 9 × 12 SASE to WØSV, St. Cloud ARC, 401 Fourth St. N., Waite Park, MN 56387.

• **The following hamfests, etc., are slated for June:**

May 30 – June 1, **Apple City ARC Hamfest '97**, Dryden, Washington. Contact Roger, WB7SHL.

June 1, **Newington Amateur Radio League Fleamarket**, Newington High School, Newington, Connecticut. Contact Fred Jarvis, N1KWJ, at 860-666-1952. (Exams by pre-registration only—contact Paul Sheldon, N1LJA, 1509 Summer Hill Dr., S. Windsor, CT 06074; phone 860-875-6246.)

June 1, **Manassas Virginia Hamfest and Computer Show**, Prince William County Fairgrounds, Manassas, Virginia. Contact Mary Lu, KB4EFP, at 703-369-2877. (Handicapped accessible.)

June 1, **The Starved Rock Radio Club Hamfest**, Bureau County Fairgrounds, Princeton, Illinois. Contact Bruce Burton, KU9A, 1153 Union St., Marseilles, IL 61341-1710; or call 815-795-2201; or e-mail <brburton@mtco.com>.

June 1, **The Hall of Science ARC Hamfest**, New York Hall of Science parking lot, Flushing Meadow Park, Queens, New York. Contact Arnie Schiffman, WB2YXB, at 718-343-0172 (evenings only).

June 1, **20th Annual Chelsea ARC Swap & Shop**, Chelsea Fairgrounds, Chelsea, Michigan. Contact K. Alan Robbins, KB8VCK, 3800 Hooker Road, Pinckney, Michigan 48169 (313-878-0363).

June 7, **17th Annual IRA HamFestival**, Hudsonville Fairgrounds, Grand Rapids, Michigan. Contact the IRA voice mail/information line at 616-534-6803; or Kathy Werkema, KB8KZH, at 616-698-6627.

June 7, **Connecticut Valley FM Assn. 7th Annual Hamfest**, Goshen-Lempster Co-op. School, Lempster, New Hampshire. Contact Conrad Ekstrom, WB1GXM, P.O. Box 1076, Claremont, NH 03743 (603-543-1389); or <goshlem@srnet.com>. (Exams.)

June 7, **23rd Annual Central Ontario Amateur Radio Fleamarket**, Bingeman Park, Kitchener, Ontario, Canada. Contact Bill Smith, VE3WHS, 32 McElderry Rd., Guelph, ON, Canada N1G 4K6; phone 519-821-6642; packet VE3WHS@VA3SED.#SWON.ON.CA.NA; or via internet: <eeaton@sentex.net>.

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June 7, **Bergen, New Jersey ARA Fall Hamfest**, Fairleigh Dickinson University, Teaneck, New Jersey. Call Jim Joyce, K2ZO, at 201-664-6725 (before 10 PM). (Exams.)

June 8, **Annual Egyptian Fest**, Hamfest, Computer Fair, Fleamarket, Granite City Campus of Belleville Area College, Granite City, Illinois. Contact Egyptian Radio Club, P.O. Box 562, Granite City, IL 62040; or call Bill Dusenbery, N9OQK, at 618-398-1456. (Exams.)

June 8, **CWRA 20th Annual Swafest & Auction**, Junction City, Wisconsin Village Park. Contact John Feltz, WA9LWJ, 973 E. First St., Junction City, WI 54443-9614 (715-457-2506).

June 8, **5th Annual Charlotte, NC ARC Hamfest & Computer Fair**, Roll-A-Round Skating Center, Charlotte, North Carolina. For information call Daryl Sampson, KM4GO, 704-522-4971 ext. 3330 or e-mail <w4cq@callsign.net>.

June 8, **Six Meter Club of Chicago 40th Annual Hamfest**, DuPage County Fairgrounds, Wheaton, Illinois. For more info call the 24-hour InfoLine 708-442-4961. (Exams 9AM–1PM.)

June 8, **Ham-O-Rama '97**, Erlanger, Kentucky Lions' Park, Erlanger, Kentucky. Contact N8JMV, c/o NKARC, P.O. Box 1062, Covington, KY 41012; or call 513-797-7252 (evenings).

June 8, **LIMARC Spring Hamfest**, Briarcliffe College, Bethpage, Long Island, New York. Call 516-520-9311. (Exams.)

June 13–14, **15th Annual Albany Hamfest & Computer Fair**, ARRL Georgia Section Convention, Albany James H. Gray, Sr. Civic Center, Albany, Georgia. Contact Arthur Shipley, N4GPJ, at 912-439-7055; or e-mail <n4gpj@isoa.net>.

June 14, **Bangor, Maine Hamfest**, Hermon High School, Bangor, Maine. Contact Roger W. Dole, RR. #2, Box 730, Bangor, ME 04401 (phone 207-848-3846). (Exams.)

June 14, **"Dukefest,"** The Executive Inn Convention Center, Paducah, Kentucky. Contact Craig Martindale, WA4WBU, 2509 Trimble St., Paducah, KY 42001; phone 502-444-6822 or 443-3860; e-mail <KC4ENA@APEX. Net>. (Exams.)

June 14, **22nd Annual MARC Hamfest**, Midland County Fairgrounds, Midland, Michigan. For information, write to MARC Hamfest, P.O. Box 1049, Midland, MI 48641 (include SASE); or call eves. and weekends 517-839-9371 or 517-496-2999. (Exams.)

June 15, **Bluefield Hamfest**, Brushfork Armory, Bluefield, West Virginia. For more information, send SASE to Bluefield Hamfest, Inc., 412 Ridgeway Dr., Bluefield, VA 24605-1630; call Don Williams, WA4K, 540-326-3338; e-mail <wa4k@amsat.org>. (Exams walk-in at 9 AM at Bluefield State College [1 mile south]; handicapped accessible.)

June 15, **MIT Radio Society & Harvard Wireless Club Fleamarket**, Albany and Main Streets, Cambridge, Massachusetts. Call 617-253-3776.

June 15, **Annual "Dad's Day" Hamfest**, Lake County Fairgrounds, Crown Point, Indiana. Contact Malcolm Lunsford, WN9L, at the Callbook address or e-mail <72202.230@compuserve.com>.

June 15, **Monroe, Michigan Hamfest**, Monroe County Fairgrounds, Monroe, Michigan. Contact Fred VanDaele, KA8EBI, at 313-242-9487 (after 5 PM). (Handicapped accessible.)

June 21, **1997 Eastern Ontario Hamfest & Computer Fleamarket**, Marmora Area Curling Club, Marmora, Ontario, Canada. Contact Pete, VA3PGB, at 613-473-1171 or Richard, VE3BZY, at 613-473-2665; or e-mail <rhobson@blvl.igs.net>; or their Web page at <www.redden.on.ca/home/~hamfest/index.html>.

June 21, **The Raritan Valley Radio Club '97 Hamfest**, Columbia Park, Dunellen, New Jersey. Contact Bob Pearson, WB2CVL, at 908-846-2065; e-mail <rwpearson-wb2cvl@worldnet.att.net>; or John Manna, WA2F, 908-722-9045 (before 8 PM).

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CIRCLE 22 ON READER SERVICE CARD

OUR READERS SAY

How Did They Do It?

Editor, *CQ:*

The frequency meter BC-221 is, of course, one of the "war-winning sets" of WW II. A whole generation of hams grew up with this superb instrument. Amazingly, it is still turning up in surplus over here in Europe, sometimes in mint condition.

While preparing a BC-221 article, I reconsidered a question that has always vexed me. As far as I have been able to find out, it seems that nobody has even asked—let alone answered—it. How were the calibration books produced? In view of the enormous production runs, automation must have been involved. I have heard of a paper—possibly a patent application—describing a setup consisting of automated tuning mechanism, frequency standard, and printer. This would have been published some 50 years ago, but so far it cannot be traced.

I would like to hear from one of the senior engineering wizards formerly involved in BC-221 production. My e-mail address is as follows: <fass@pi.net>.

Frithjof Sterrenburg
Sijbekarspel, Holland

Highlight of A Career

Editor, *CQ:*

Thank you very much for using my photo for the April cover of *CQ*. When I started in ham radio, I didn't even imagine that this might happen some day! It's a highlight of my ham radio career. Good job on the write-up, too. My wife and I went to the local radio store to take my photo in front of the magazine rack.

Rich Boyd, KE3Q
Bowie, MD

Fleming Knighted

Editor, *CQ:*

This letter is in regard to the inaccuracies and omissions in the "Washington Readout" column of February 1997, about Standard time.

While Dowd (1869), Abbe and Brooks (1878) had papers on timekeeping, it is Sir Sandford Fleming, Scottish born Canadian civil engineer, to whom the world owes the credit for Standard or International time. Fleming put forth papers to carious committees in Canada and England proposing 24 longitudinal zones. Some of these committees he chaired—among them Montreal 1881. The International Geographic Conference was held in Venice, Italy, September 1881, where he presented his paper.

Out of this came the International Prime Meridian Conference in Washington in October 1884, where Fleming presented his proposal. This was adopted and went into effect at Greenwich on January 1, 1885.

For this, the trans-Pacific cable, and other achievements Fleming was knighted in 1897.

P. H. Lacey, VE3DIT
Kitchener, ON, Canada

Remove Three-Tier Code Mandate

Editor, *CQ:*

I've read the change ideas for amateur licensing in the March issue of *QST*. It is due for the Novice class change. However, if you made all these changes, there would only be minor short-term gains. This amounts to throwing a bone to lower-class operators and hoping the upswing of Cycle 23 will do the rest. This is an excuse to avoid making the strong changes that are needed to benefit the majority, and amateur radio as a whole, for the years beyond Cycle 23.

In addition, this is a blatant attempt to lock-in and reinforce the three-tier code mandates here in the face of the high likelihood of the removal of the treaty code mandate at WRC-99. The FCC, being as they are, would be very unlikely to entertain any changes after WRC-99 for years if they were required to make these changes beforehand. Real change, real improvement, requires unselfish courage and foresight, not Extra class protectionism. The Internet will continue to grow due to unenthused and disgruntled amateurs.

Michael McCarty, KG8XF
Galloway, OH

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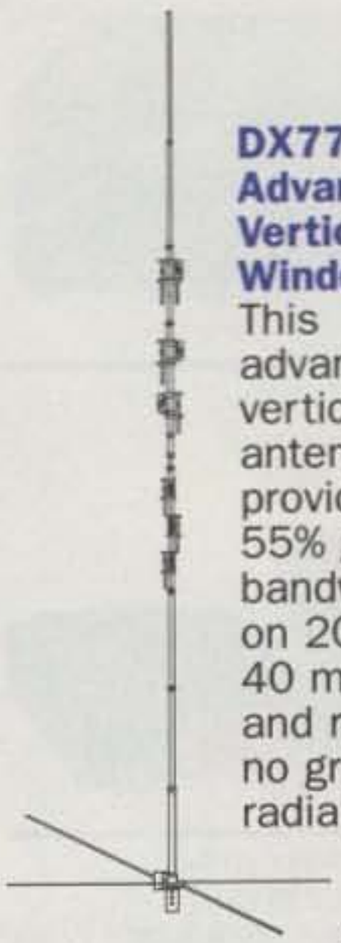

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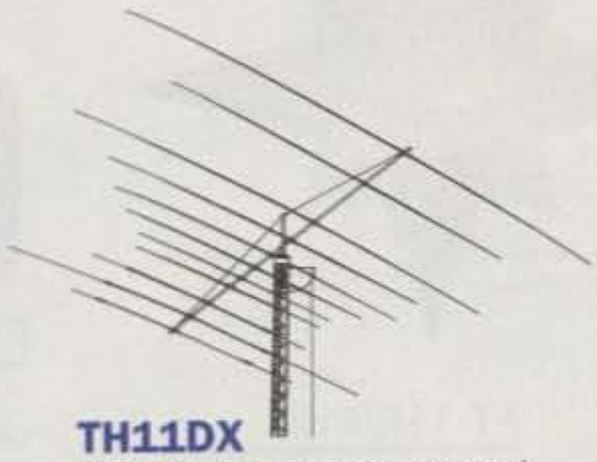

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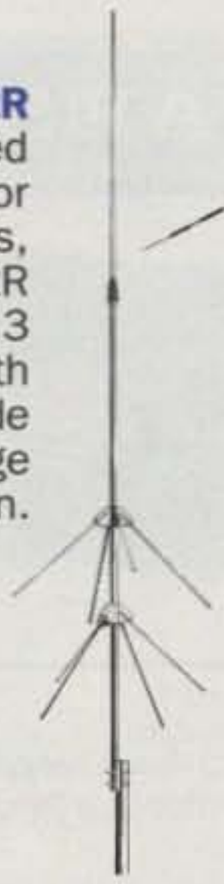

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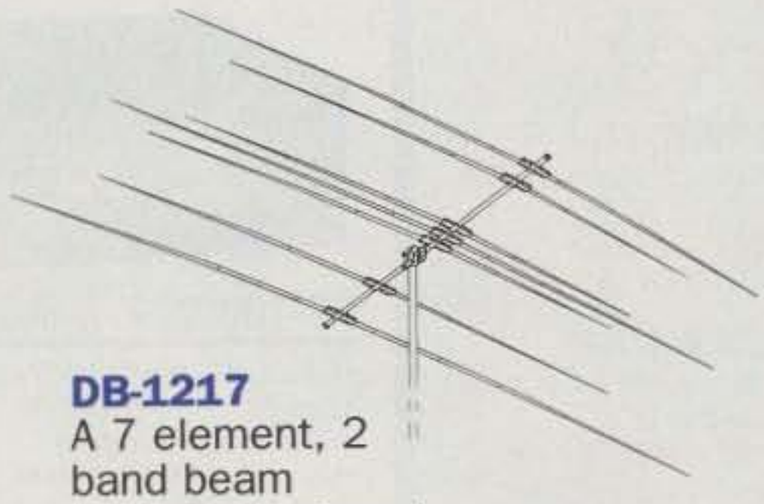

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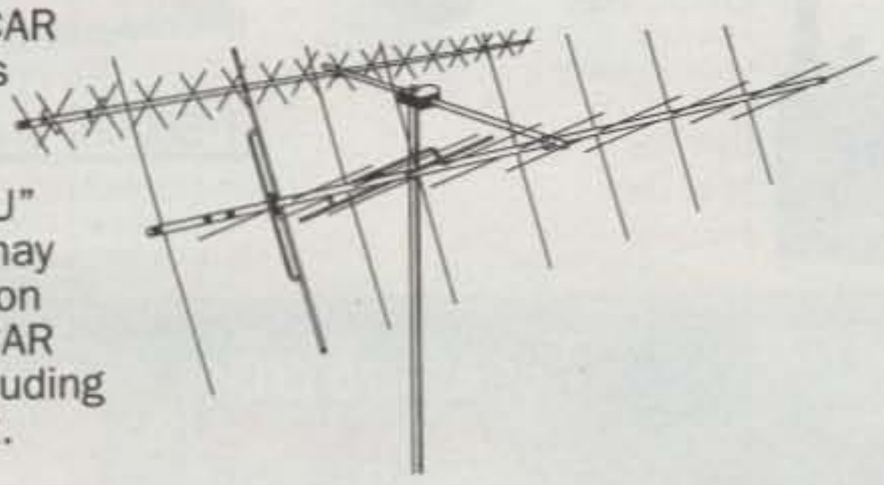

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From the bottom of the world and from the bottom of the solar cycle twenty men executed the largest amateur radio DXpedition ever. It was a daring event, but one which lead to success.

VKØIR
1997 Heard Island DXpedition

BY PETER CASIER*, ON6TT

Prologue: the end of October 1995 . . . It is difficult to describe the feelings that went through our minds, sitting with eight DXpeditioners in the living room of VK6UE in Perth, Australia. We realized we had failed. The boat we had rented to go to Heard was a wreck, and the owner had run off with our money. Our financial losses were high. Our confidence in ourselves had taken a real hit. There we sat, with polar clothes packed in our bags and a few tons of equipment ready to go. And we would not be going. . . .

We flew back to our homes, licked our wounds for a month, and decided to go. We would persist and succeed, whatever the cost. Ralph, KØIR, who was the 1995 DXpedition leader, was not sure he could come along in the next attempt, so he asked Bob, KK6EK, and I to take over the management of the project. Bob would take care of most of the logistics, and I would coordinate the radio operations. We were supported by the DXpedition board, which consisted of N6EK, NP4IW, and KØIR.

*Oude Heerbaan 30, B-9230 Wetteren, Belgium

The view of Atlas Cove, the inlet where our camp was set up.

The VKØIR expedition crew: (from L to R)
Back row: **9V1YC**-James (camera man), **K4UEE**-Bob (USA fundraising and public relations), **HB9BHW**-Hans-Rudi, **EA8AFJ**-Michel, **ON6TT**-Peter (expedition leader, radio operations), **N6MZ**-Mike.
Middle row: **KK6EK**-Bob (expedition leader, logistics), **OE9AMJ**-Arno, **KØIR**-Ralph (co-organizer, antennas), **HB9AFI**-Kurt, **K9AJ**-Mike (medical), **PA3DCU**-Arie (Email, satellite operations), **N6EK**-Bob (computers, logs and networks).
Front row: **WBEMG**-Wes (electrical power), **K3VN**-Al, **RA3AUU**-Harry, **VK2JDM**-Dave (safety and emergency preparedness), **WOGJ**-Glenn (hygiene), **ON5NT**-Ghis (EU public relations), **HB9AHL**-Willy (food services, vessel).

QSL of the history-making 1997 Heard Island DXpedition.

A New Start

There are three critical fundamentals you need to run a DXpedition: transport, money, and people. Transport was first on our to-do list. We did not want to run any risks anymore, so we went for a good boat from the first moment on. After a month we found the *Marion Dufresne*, the Antarctic research and logistic support vessel from TAAF/IFRTP, the French Antarctic Department. After some negotiations we got the price down to US$200,000 with a guaranteed stay on Heard of 14 days. The price of the boat caused a chain reaction of events. We adjusted the budget of the DXpedition to a total of US$320,000, *not* including the US$200,000 losses from 1995. We needed a large team to cover the US$320K, so we decided to go for 20 people. If each contributed US$10K, it would cover the cost of transport. The rest of the money would have to come from sponsors.

We broadcast on Internet that we were looking for participants, and much to my surprise we received many applications. People were accepted on the basis of how they would fit into the team character-wise, much more than on the basis of their radio or DXpedition experience. Later on that proved to have been the right decision.

Because of the $200K for the vessel, we needed 20 people. Because of the 20 people, we needed a lot of logistic material. The amount of work to prepare all of it was enormous. One of the key decisions made early on (and Bob, KK6EK, gets the credits for this) was to tightly integrate all participants in the preparation of the DXpedition and to divide the work among them. The "czar" system was born: Each critical part of the operation was assigned to a "czar"—someone who would coordinate the preparation of that part. We had a czar for antennas, generators/electricity, the food services, radio operations, logistics, emergency procedures, hygiene, medical issues, computers, pilot stations, data transfer, etc. In this way we tightly integrated each team member in the operation, and each worked for a full year to prepare for VKØIR. The fundamentals for a strong team were laid out.

Apart from the team members themselves, we had a whole team of technical support people who would work behind the scene while we were on Heard: seven pilot stations coordinated by ON4UN, three people who would manage the Internet and packet servers, QSL managers, advisors, and so on. They too worked like demons to turn VKØIR into a success.

Reunion, December 1996

Arie, PA3DUU, and I were the first of the team to arrive on Reunion. It felt like the calm before the storm. Soon the rest of the team would arrive, and six weeks of intense work would start. We felt the electricity in the air. Over 20 tons of cargo had arrived from Minnesota, California, Belgium, Marseille, and Australia—and the cargo company had lost half of it. We phoned and drove around like crazy until all the pieces of the puzzle fell together. Meanwhile, the team members arrived and got on the air as TOØR, mainly on 160 meters and RTTY.

December 31 was a day filled with trouble. We were told that the crew of the *Marduf* (the nickname of our vessel), which works for the French Maritime Services, would go on strike, delaying our departure for two days. I remember how Ralph, Bob, and I sat together on New Year's Day at 3 AM near the swimming pool of our hotel, discussing the strategy to follow. Later that day, during a meeting with Claude Chaufriasse, the TAAF coordinator on the *Marduf*, we agreed to skip Crozet and sail directly to Heard. One more victory for the team—hi.

On January 2, 1997 we loaded everything onto the *Marduf*. We had 27 barrels containing 200 liters of fuel, 7 containers filled with 400 liters of water, 2 tons of food, 2 tons of propane gas, a few hundred kilos of fresh food and soda, all in addition to the cargo we had sent up. By the time we landed on Heard, the total weight of our supplies would come to 34 tons.

Meanwhile, our crew was complete: James, 9V1YC (our cameraman); Bob, K4UEE (USA fundraising and public relations); Hans-Rudi, HB9BHW; Michel, EA8AFJ; Peter, ON6TT (DXpedition leader, radio operations czar); Mike, N6MZ; Bob, KK6EK (DXpedition leader, logistics czar); Arno, OE9AMJ; Ralph, KØIR (co-organizer, antenna czar); Kurt, HB9AFI; Mike, K9AJ (medical czar); Arie, PA3DUU (e-mail czar, satellite operations); Bob, N6EK (computers, logs and networks czar); Wes, W8FMG (electrical power czar); Al, K3VN; Harry, RA3AUU; Dave, VK2JDM (safety and emergency preparedness czar); Glen, WØGJ (hygiene czar); Ghis, ON5NT (EU public relations); and Willy, HB9AHL (food services czar, vessel coordinator). The last days on Reunion we had daily meetings and worked with our cargo. Most of it had to be recrated, and we made sure that every team member knew every little bit of our cargo. There was a lot to learn.

The *Marduf*, January 5, 1997

Finally, at 4 PM the *Marion Dufresne* left the harbor enroute to Heard Island. We waived goodbye to the Reunion amateurs who had been so helpful, and with some shivers running down our spines we took a deep breath: "Heard Island, here we come!"

An hour out of port we were joined by the Lama helicopter and its crew—Ton-Ton, the pilot, and Pascal, the mechanic. Both would be key people during the landing.

Ghis, ON5NT, is on the left, and the author, Peter, ON6TT, is on the right.

The next day we had a meeting with the ship's crew, who stressed the importance of a well-prepared landing, making use of every available minute of good weather. They asked us to recrate all of our gear into bigger crates, and to weigh every single crate to make sure that the helicopter could lift it. The Lama could take 850 kgs (or about 1900 lbs.) maximum.

And so we prepared. For six long days our crew worked hard. The landing was prepared down to the most minute details, and the cargo was crated and recrated, and crated and recrated again. To gain landing time we also pre-

Here is the entire DXpedition team aboard the Marion Dufresne.

The Marion Dufresne, *the vessel that took us to and brought us back safely from Heard Island.*

assembled the floors of our polar shelters on the ship. We had meetings and training sessions with our computers, radios, and amplifiers. We learned how to get in and out of the helicopter, etc. It was a busy time.

Heard Island, January 11

At 8 PM on January 11, just before sunset, we finally sighted Heard Island. KK6EK, KØIR, 9V1YC, and I did a quick reconnaissance flight to the island to locate the sites where we would land all the gear and set up camp the next day. It was a dark evening—rainy, misty, cold. We could see two colors on Heard—white from the sky, the mist, and the glaciers in the distance, and black from the volcanic sand and rocks. Heard did not look very inviting. In 15 minutes we marked the site for the main camp with flags, but could not find a location for the two operating sites. The area was too rocky and uneven to set up shelters.

We flew back to the ship and held a team meeting. We decided to change our site plan a bit. The main village, consisting of the two sleeping shelters and a kitchen shelter (each 4 × 8 meters), would also have the satellite tent and the CW tent (each 4 × 4 meters). The next day we would try to locate two more flat areas for the 2.5 × 2.5 meter shelters, each separated by 300–400 meters, which would hold the SSB tent and the auxiliary operating tent. This way we could separate the main CW tent (called OP1, holding three stations plus satellite) and the SSB tent (called OP2, sheltering two stations) by 700–800 meters, and put one

This outcropping is called Roger's Head. It was a few hundred meters north of our camp.

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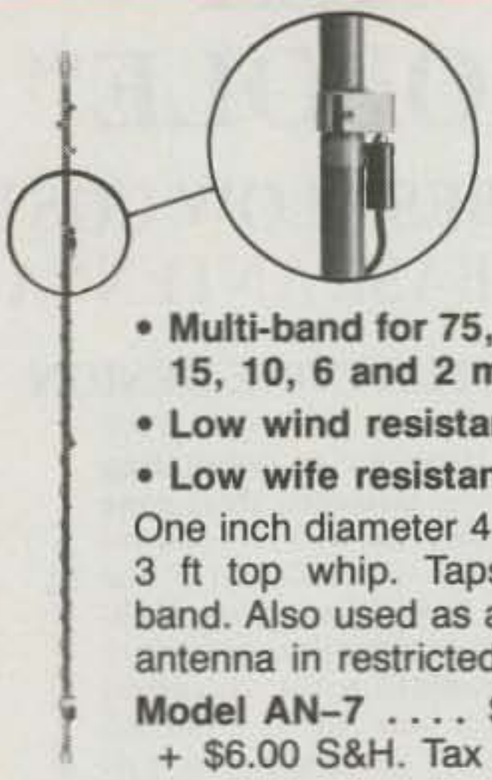

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more HF station at OP3, in the middle. The way we laid out the camp, we would be able to beam parallel while working all main continents, as such maximizing the beam's side rejection and allowing us to work on the same band in three modes. This had never been done before on a DXpedition!

On January 12 we started landing at 4 AM. The landing was so well planned that everyone knew exactly what to do and how to do it. Not one of our 20 team members was standing about looking for work, or waiting for an "order" about what to do, or running around trying to find a tool. It looked like a military operation. It was great.

The helicopter carried the 34 tons of equipment in 51 flights, which took 5 hours. When the captain came over to the island to have a last look to see if we were okay, we already had the five shelters of the main camp up, a generator running, and the soup warming up. He shook his head, laughed, called us "crazy guys," and got back into the helicopter. Ton-Ton flew around the camp once and did a low fly-by over the camp as a good-bye sign. We all stood around waving. We would not see the ship again for another three weeks. Would we manage? What would the future hold for us? Success or defeat?

About fifty trips in the Lama helicopter such as this one were needed to carry out gear back and forth to the ship.

Setting Up Camp and Getting On The Air

Around 1100Z on the day of the landing, February 12, we put the NCDXF HF beacon on the air—the first sign of life of VKØIR. This would allow people to prepare propagation reports and send them to John, ON4UN, our pilot coordinator so that by the time we got on the air, we would not only have a chart with the propagation predictions, but also an overview of the beacon reports.

We spent the rest of the the first landing day setting up the main camp. The next day we erected OP2 and OP3 and started with the antennas. Heard was good to us, as the weather was cooperating—sunny and no wind, excellent antenna weather. Around noontime on January 14 we were ready. All antennas for the main stations had been installed. I counted about 25 antennas or so, several miles of coax, electrical wire, and control cables, five HF stations, one VHF sat station, the inmarsat telephone, five generators with a total capacity of 32 kw, all computers, the kitchen, the sleeping tent, the cargo, and the fuel, all secured so nothing would blow away in the next storm.

We had agreed not to make any QSOs before all was ready, and ready we were. We made a telephone call to ON4UN, asking him to come on 20 meters and make the first QSO with VKØIR. John came in 5/9, and immediately the pileups started. We told them to wait a bit and held a very short team meeting in which we said:

"We have now completed phase I of our operation—the preparation. But no matter how well we prepared, no matter how much it cost us to get here, no matter how much cargo and antennas and radios and people we have here, *now* is the time to prove how good we are. *Now* is the time we have to do our work, and do it well, being judged on our performance day by day, second by second. Our audience does not care how much we landed, or how long we prepared; they just want to get in the log and enjoy this expedition. Gentlemen, now is the time to show what we are really made of. Remember what we agreed upon in the radio operation's manual. Let's get to work."

By a flip of a switch, five stations came on the air at the same time. We got to work.

CQ de VKØIR

The first six hours everyone got a chance to operate, but from then on, until the end of the operation, we worked by a preset schedule. Based on the propagation predictions and the beacon reports, I assigned operators to each shift. Every operator knew which radio to man, what continent to look for, and on what band. This way we could work in a systematic way and make sure that every continent got equal attention and that we would give as many as possible a new first contact with Heard, but we also could work on as many band/modes to each continent as possible.

Once again it looked like a military operation. Everyone knew what to do, and there were no conflicts or questions. Our radio operation was done with the same quality as the preparation and landing. It felt great. Unfortunately, right at the moment we got on the air with HF, the satellite PACSAT radio died. This radio was to be used daily to upload our logs, digital pictures, feedback to the pilots, and a summary of the activity to our Internet and packet servers. We fell back onto the data link by satellite telephone, but that showed some problems, too. The PACSAT radio problem was solved when we found out that the radio worked if we put it in the cold before operating, and soon we were "online" with our public.

Arie, PA3DUU, uploaded our first logs, pictures, and reports, and got the daily feedback from the pilots. The first days were very busy, as everyone in our audience wanted to work us on all bands and modes as quickly as possible. However, after the first days of nervousness, the amateurs worldwide started to have confidence in our operation and saw that we used the right propagation openings to each continent, no matter how difficult the path was.

Apart from the radio operating schedule,

Say You Saw It In CQ

people were assigned work duty (or slave duty, as we called it) to prepare food, maintain and clean the camp, and put up more antennas, etc. After a few days of work I counted 32 antennas in the air as follows:

OP1, the three CW stations, had a monoband beam for 20, triband beam for 10-15-20, triband Yagi for 12-17-30, vertical for 30, R5 vertical, a Battlecreek Special for 40-80-160, four phased verticals for 40, another four phased array for 80, and another one for 160. We also put up some beverages to the main continents.

OP2, the two SSB stations, had a 40 meter Yagi, 20 meter Yagi, tribander for 10-15-20, duobander for 12-15, and a 17 meter tall ON4UN special for 75 meters.

OP3 had a tribander for 10-15-20, a 30 meter vertical, and an R7. The HF beacon was running at OP3, too, although after a few days we switched it off, as it caused slight interference. Later on we would air it again on 10 meters only.

As planned, we had no cross-band interference at all, mainly due to the separation between the antennas, and because we ran with bandpass filters. And, we were running CW, RTTY, and SSB on the same band, without significant QRM one from another.

RTTY was a special story. There are no more than 850 active RTTY DXers in the world, so I thought to run a few days of intense RTTY and then switch over to what I love to do—SSB pileups. However, those RTTY ops kept on coming, and we decided to continue to run RTTY, on 20 meters only, making sure that every station we worked was a new station on RTTY.

We were very well equipped for the low bands, and as the antennas we used were installed on the beach, above salt water, we put out a big signal on 160-80-40. We got reports saying, "Never heard a stronger 160 or 80 meter signal before in our life." Indeed, some nights 160 meters sounded as 20 meters does. Stations from all over the world blasted in.

This is a view of the main camp, with two sleeping shelters in the back of two other shelters. The kitchen shelter is in the left foreground, and the satellite and CW tent in the right foreground.

The quality of the equipment we used helped a lot. We had four Yaesu FT1000MP's (superb rigs), three FT900's, four Alpha 91B's, and one Alpha 89. We used Heil boomsets, ICE bandpass filters, and Compaq portable computers.

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contacts. This was rock and roll; this was great! Our QSO total went up and up and up. Each day the logs were gathered from all the computers and merged. N6EK spent three hours per day making sure we had made no errors in changing bands and modes. He ran statistics, which we hung in the kitchen tent for all operators to see. He also generated daily figures on what continent we worked on what band, at what time. That combined with reports from the pilots allowed us to update our big propagation sheet which hung in one of the tents. That sheet was the core of our operation, showing to where we had propagation, on what bands, at what time, and indicating long path or short path. This helped me a lot in making the daily schedules for the operators, ensuring we skipped no single opening to any continent.

Meanwhile, the weather had turned into the typical Heard weather. Every day the temperature was around the freezing point, with the wind chill factor showing –20 degrees C. It was raining, and sometimes snow or hail would hammer on our tents. The wind was blowing at about 60 km/hour—every day. Sometimes we would get a break in the weather, and then the sun showed its face. That allowed us time to admire the beauty of the environment. Big Ben, the 10,000 feet high volcano, would show its top, and we took walks to the penguin and seal colonies. Heard Island is an amazing place. As one of the operators said, "On the bad days with wind and rain I wonder what forgotten hole this is, and sometimes it looks like paradise. But most of the time it is a cold and windy place."

The daily reports from our pilots started to show more and more "congratulations" messages, and "thank you's," "got through with 5 watts and a simple vertical," "thank you for making use of that single 10 minute opening to USA west coast," etc. It made us feel good and encouraged us to keep on running as planned, managing the pileups in an organized, well-behaved manner.

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Polar envelope (sent up from (Antarctica)	200BEF/7$	250BEF/8$	now
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Table I– To help cover the costs of the DXpedition, which totalled well over US$500,000, some items are being sold. Some are souvenirs, while some are real reference material. For Europe, the following is available via Ghis Penny, ON5NT, Lindestraat 46, 9880 Aalter, Belgium (no checks please but eurochecks in Bef).

Time To Go

We had daily contact with the *Marion Dufresne*. They gave us a call by the satellite phone or faxed us the weather forecast. The forecast did not show much good weather for the last days on Heard. The ship planned to arrive at Heard on January 28, and the crew urged us to be ready with all our gear so we could make optimum use of any good weather.

Late on January 26 we sat together and decided to make our last QSO the next day. KØIR did the honors with ON4UN at around noon GMT. Ralph concluded the transmission from Heard by saying, "It is hard to mark this moment, John. Is this the end or just the early start of a new beginning?" It was an emotional moment for us. We had succeeded in our goals: We had run this expedition in the best way we thought possible, paying equal attention to each mode and band, to each continent. We made over 1200 QSOs on 160, worked more than 2000 different RTTY stations, made 600 contacts on Oscar 10, and totalled 80,673 QSOs with 27,500 different stations. Phase II of the operation was a success. Now we had to start phase III, the post operation part, including getting all equipment and supplies and everybody off the island—safely.

Again as planned, we took down all shelters except the sleeping and kitchen tents, and packed tons and tons of equipment back into the crates, making sure that no garbage was left lying around. As predicted, the weather was bad—very bad. The wind peaked to 100 km/hour, and over 150 km/hour on the ridge at OP2, where it was sometimes even difficult to stand up. Some antennas became damaged in the storm as we took them down. But when the going gets tough, the tough get going, and we had a job to do.

On January 28, late in the evening, we had a VHF contact with the *Marion Dufresne*. As the ship came into sight, they blew their horn as a signal for us to get ready. Before we knew it, the helicopter was flying over the camp and the evacuation began. Seven people stayed on Heard the last night. Only two shelters were still up, with emergency communications and food rations. The rest was packed as planned.

On January 29, the next day, the helicopter gave us a wake-up call by flying very low above the camp at 5 AM sharp. Another work day on Heard began. It was quite a sight seeing everyone doing their jobs while the helicopter flew back and forth with cargo. There were no discussions, no people standing around, no looking for tools. We knew how to do this; we had prepared for it. We had done it a thousand times in our imagination.

Fifty helicopter flights were needed to take everything off. We left the island behind as we found it, with no trace of our presence.

Bob, Ralph, and I took the last helicopter off the island. As we flew over the camp, we knew we had done it. VKØIR was over. We had set new standards and provided many people with a lot of fun both by working us and following our DXpedition over the Internet and packet. For them the expedition was over. For us, another six months of work would follow. That would be done, however, with the knowledge that "we had done it" from the bottom of the world and the bottom of the solar cycle.

(The foregoing article was forwarded to us courtesy of CQ's French sister publication, CQ Radioamateur, Le Magazine des Radioamateurs Actifs, *and its Editor-in-Chief, Mark A. Kentell, F6JSZ.—K2EEK)* ■

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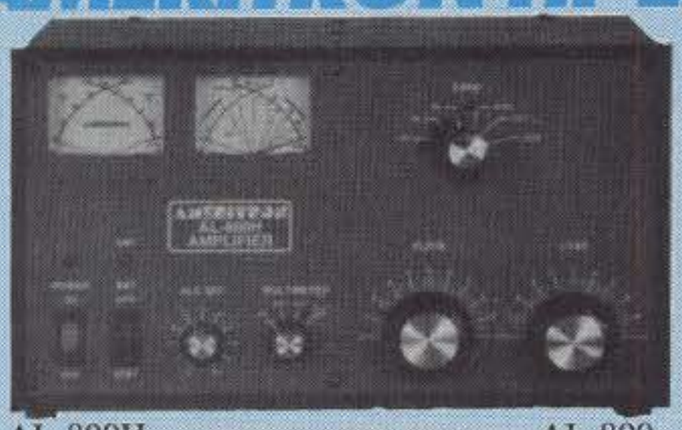

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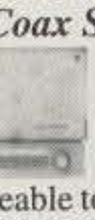

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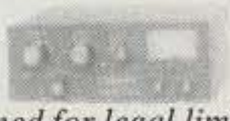

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CIRCLE 155 ON READER SERVICE CARD

Results of the 1996 CQ WW VHF Contest

BY JOE LYNCH*, N6CL

Conditions were poor to fair to good for the 1996 contest, depending on where in the world you were. The far northeast coast enjoyed a European opening, whereas the west coast got little propagation, if any. The total number of entrants was just over 100, about the same as it was for the 1995 contest.

The Winners

The highest score turned in this year was from a QRP operator. NM1K amassed over 102k while operating on nine bands! The top Single Fixed operator was VY2KX, with a score in excess of 85k. The top Single Portable scorer was K1TOL with 57k. The top Multi-Op Fixed Class I was KE7SW with 2.2k. The top Multi-Op Portable Class II entrant was WØKEA with nearly 24k points. The top Multi-Op Fixed Class II was E21DKD with more than 28k, and they did that by making 1360 QSOs! Speaking of Thailand, there were ten entrants who worked the contest only on 2 meters and with only 10 watts PEP. Thanks to John Narissara Shaowanasai, HS1CHB/N9WMS, for forwarding their logs.

This and That

The first Laser QSO was reported between AJ6T and WB9AJZ/R. In fact, there was a noted increase in use of all the microwave bands in this year's contest. This use of microwave made the difference between K7ND and WA7UQV, with the former beating the latter by just a few points all because of microwave multipliers!

The QRP category is proving increasingly popular, with more than one fourth of the entries being in that category. Accordingly, there were more winners.

Thanks to log sheets that had the prefix listed on them being circulated, some of you thought we were again counting prefixes. We are not. Those who took credit for them had their scores recalculated according to the present rules.

Once again your scribe missed the contest, being in Sarajevo, Bosnia during that weekend and having no access to any VHF gear. Maybe this year we will be back in the test.

Random Comments

Fair to poor propagation on 50 MHz. Strong signals from VE. Where were the W4s and W5s? . . . *WB8K*. This was our first contest. All equipment was begged and borrowed. It was interesting trying to do manual rotations on the beams, while QSOs were attempted. The whole setup was on a remote logging road with a tarp to cover us from the blazing sun. Mosquitoes were so bad at one point that Dave, VE7KNO's white shirt looked gray. Despite the 'skeeters, he managed to pull off his first CW QSO! Dave and Fred had their first CW QSOs during the contest. . . . *VE7NNW*. Six was good for volume but not much double hop. Had a lot of fun. Good to Europe. . . . *VE1ZJ*. The contest sure had the god of propagation shining on us with widespread openings on 6 meters, including Europe! Will be back next year for sure. Thanks again, *CQ*, for a fantastic contest! . . . *VE1PZ*.

Looking forward to next year's contest. I got lots of new friends! . . . *HS6FVZ*. I'm very happy. Everybody was so cooperative. . . . *E20XJ*. *CQ*, in my opinion, is a good competition for ham radio operators only if you know a word—"competition." You will fill challenger in an attractive game. . . . *HS1RNW*. HS50A is a special callsign to commemorate the 50th anniversary of the King of Thailand's (HS1A) accession to the throne. This contest and the callsign were lots of fun. . . . *HS5ØA*. The contest was lots of fun! Looking forward to next year! . . . *E21RWD*. We're very happy that DXers group was able to contact and QSO with 1360 ham radio operators in almost 26 hours. This includes 48 provinces in Thailand, which we are very proud and honored to have participation in CQ WW VHF Contest. . . . *E21DKD*.

This was my first contest. I've been licensed since May 1996. Many thanks. . . . *ON2LBJ*. My first CQ WW VHF Contest. I enjoyed the contest in the same way as DX FH contest with a handie-talkie! . . . *JH6SQI*. My best fun was looking for Europe and getting called by VE4AS in EN29 off the back of the beam. It was the first time I've worked that far north and west with regular Ex instead of Auroral E. The conditions were quite good all through the contest. I'm sure that 6 is open to somewhere practically all the time; it just takes a contest to get the activity level up. Even when the band was devoid of humans, I was hearing one or two U.S. beacons constantly. The last two hours were the only really quiet ones for this contest. Up 'til then it was fairly busy. I'm looking forward to next time. . . . *VE1JH*.

Very excited to make my first Laser QSO (with WB9AJZ/R) during this contest. Ran 5 mw red pointer beam with Celestron C90 telescope and photodiode for the receiver. The visible beam was very bright to the naked eye at 13 miles! . . . *AJ6T*. It was a great opportunity to get a transatlantic Es on 6 meters during the contest. Very nice contest! . . . *F5JKK*. No double hop to the west coast this year, but some propagation to Europe. This is becoming my favorite contest. . . . *VY2KX*. For me not a bad contest. My best CQ World-Wide VHF Contest. I added Washington state for 46th, and 10 new grids. . . . *VE2BKL*. Sporadic-E was poor across most of the U.S., but the little opening to Europe was fun. Worked ON, I , F, G, GW, SM, DL, OZ, GM, GD, EI, along with VE and W. Also logged eight fields, DO, EN, EO, FN, IN, IO, JN, and JO, but almost missed my own grid! Is there a field bonus? . . . *W3EP*.

First VHF contest; great fun! Erratic sporadic-E. . . . *AA9BJ*. Got a new grid square. Bless contests! . . . *K6IAH*. Fogged in half the time (on a 100 foot cliff above Lake Michigan). Had a wonderful time despite the absolute

The Thailand Group, E21RWD, one of the multi-op teams which participated in the contest. (Photo courtesy E21RWD)

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Say You Saw It In CQ

VHF RESULTS

Number groups after call letters denote following: Final score, number of QSOs (including multipliers for band and CW contacts), Total grid locators, Bands operated (A = 50, 7 = 70, B = 144, C = 222, D = 432, 9 = 902, E = 1296, F = 2304, G = 3456, H = 5670, I = 10G, J = 24G, L = Light), (in the case of Rovers) number of grid locators activated, additional operators. Certificate winners are listed in bold.

SINGLE OPERATOR, FIXED

EUROPE

PORTUGAL

CT1DQM	**8**	**6**	**48**	**B**

SPAIN

EB1FIF	**30**	**17**	**510**	**B**

FRANCE

F5JKK	**173**	**90**	**15,570**	**ABDE**

NORTH AMERICA

CANADA

VE1ZJ	**468**	**110**	**51,480**	**ABDE**
VE1PZ	319	98	31,262	A
VE1JH	249	79	19,671	A
VE2BKL	**75**	**44**	**3,300**	**A**
VE2SHW	10	1	10	B
VE3SRE	8	7	56	AB
VE7SKA	**105**	**29**	**3,045**	**ABD**
VE7XO	6	3	18	AB
VY2KX	**599**	**142**	**85,058**	**ABDE**

MEXICO

XE2HWB	**51**	**23**	**1,173**	**A**

UNITED STATES

W1

N1MIA	**224**	**88**	**19,712**	**A**
W3EP/1	83	31	2,573	A
W1AIM	55	35	1,925	A
N1LZC	23	14	322	ABD
WA1NYV	20	6	120	B
KE1FE	15	2	30	BD

W3

WA3TLT	**37**	**28**	**1,036**	**A**

W4

AD4F	**41**	**11**	**451**	**ABD**
N4TL	25	16	400	A

W5

KB5IUA	**303**	**98**	**29,694**	**ABCD9E**
KB5OAI	95	46	4,370	ABCD
N5EOP	70	40	2,800	AB
KC5LOW	54	31	1,674	AB
W5EHM	49	25	1,225	AB
KBØLYL/5	81	5	405	B
KB5ZSK	22	4	88	ABCD

W6

AJ6T	**55**	**20**	**1,100**	**ABEL**

W7

K7ND	**172**	**32**	**5,504**	**ABCD9EF**
WA7UQV	153	35	5,355	ABCD

W8

N8ZJN	**41**	**25**	**1,025**	**A**
K8OOK	33	26	858	A
KC8BDB	25	15	375	ABD

W9

WB9SNR	**146**	**53**	**7,738**	**ABCD9EFH**
WD9IIX	107	47	5,029	A
WA9CCQ	53	33	1,749	AB
AA9BJ	17	15	255	A
NEØP/9	14	12	168	A

WØ

NØMMU	**110**	**43**	**4,730**	**ABD**
WA2HFI/Ø	92	40	3,680	ABCD
WG6K/Ø	72	52	3,744	ABCD
KBØWWG	80	43	3,440	AB
KBØVUK	73	38	2,774	ABD
KFØRB	48	20	960	B
WØRT	40	23	920	ABD

SINGLE OPERATOR PORTABLE

EUROPE

PORTUGAL

CT4LV	**24**	**14**	**336**	**BD**
CT1CLR/p	21	13	273	BD

SPAIN

EB1DNK	**72**	**30**	**2,160**	**BD**
EB1EWE	62	32	1984	B

NORTH AMERICA

UNITED STATES

K1TOL	**390**	**147**	**57,330**	**A**
N6NB	**362**	**93**	**33,666**	**ABCDE**
KN6WY	101	26	2,626	ABD
KA7MFM	26	12	312	ABD

MULTI-OP, CLASS I, FIXED

NORTH AMERICA

UNITED STATES

KE7SW	**103**	**22**	**2,266**	**ABCD9E**
			(Oprs. not supplied)	
KF6DST	70	12	840	ABCD
			(Oprs. KB6AID, KB6HRB, KB6JBY, KB6QNP, KC6UCN, KE6YRZ, KE6ZAK, KF6ARN, KF6DDT)	

MULTI-OP, CLASS II, FIXED

ASIA

THAILAND

E21DKD	**1360**	**21**	**28,665**	**B**
			(Oprs. E21IYW, E21FSK, E21MVF, E21BVI, HS1LEQ)	
E21RWD	598	15	8,970	B
			(Oprs. HS1JQP, HSØXNO, HS2SVH/1, HS5JRH/1, HS9HQR/1, E21EIC, E21LSE, E21SNN, E2ØDYA)	
HS2JFW	414	5	2,070	B
			(Oprs. HS2JFW, HS2MWH, E21JUC, E21FZP, E21TWE, HSØNTN)	
HS5ØA	203	6	1,218	B
			(Oprs. HS1CHB, HS1CKC, HS7IKF, E21ENF)	

NORTH AMERICA

UNITED STATES

K1IKN	**162**	**66**	**10,692**	**AB**
			(Oprs. WA1ZPI, N1IIN)	
KF7E/5	80	49	3,920	ABD
			(Opr. KB5TZJ)	

MULTI-OP, CLASS II PORTABLE

EUROPE

THE NETHERLANDS

PA6SIX	**232**	**63**	**14,616**	**A**
			(Oprs. not supplied)	

NORTH AMERICA

CANADA

VE7NNW	**91**	**20**	**1,820**	**ABD**
			(Oprs. VE7EAU, VE7LNX, VE7KNO)	

UNITED STATES

WØKEA	**238**	**100**	**23,800**	**ABCDE**
			(Oprs. W1XE, KBØSDB)	
AA8BC	129	60	7,740	ABDE
N8PVT	71	55	3,905	ABD
			(Opr. KC8ALA)	
AE6E	32	21	672	ABCD

QRP

ASIA

JAPAN

JH6SQI	**12**	**3**	**36**	**DE**

THAILAND

E2ØXJ	**595**	**9**	**5,355**	**B**
HS1RNW	184	23	4,232	B
HS6FVZ	312	20	6,240	B
HS7HYB	253	14	3,542	B
HS9HIG	245	10	2,450	B
HS6MYW	130	13	1,690	B

EUROPE

BELGIUM

ON2LBJ	**44**	**21**	**924**	**B**

FRANCE

F1AKK/P	**19**	**6**	**114**	**B**

PORTUGAL

CT1ETE	**3**	**1**	**3**	**B**

SPAIN

EA7AJ	**121**	**37**	**4,477**	**AB**

NORTH AMERICA

CANADA

VC2PIJ	**113**	**56**	**6,328**	**ABD**
WG1Z/VE1	4	2	8	B

UNITED STATES

W1

NM1K	**849**	**121**	**102,729**	
ABCD9EFGH				

W2

NB2T	**135**	**15**	**2,025**	**BCD**

W5

WA5VKS	**109**	**32**	**3,488**	**ABCD**

W6

WA9STI/6	**70**	**14**	**980**	**ABD**
KE6QXJ	31	8	248	BD
K6IAH	5	4	20	AB

W7

N7EPD	**93**	**24**	**2,232**	**AB**
NJ7A	19	5	95	BDE

W8

WB8K	**179**	**63**	**11,277**	**ABD**
N8AXA	79	28	2,212	ABCE

W9

N9TZL	**41**	**18**	**738**	**B**

WØ

NØQXC	**34**	**16**	**544**	**B**
KBØOOL	18	15	270	B
NØOBF	2	2	4	B

ROVER

NORTH AMERICA

UNITED STATES

KK5RH/R	**82**	**90**	**4,590**	**AB 2**
			(Opr. KD4JDT)	
K9DTB/R	28	16	448	ABCD 2
KC5MGL/R	18	10	180	B 3

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CIRCLE 61 ON READER SERVICE CARD

WØKEA operated from this winning location in Colorado. KBØSDB can be seen installing the 3818 kHz listening antenna.

death of 2 meters the entire contest. Six meters was superb with pipelines into the northwest and east to the Canadian Maritimes. Eighteen new grids on 6. Hope there was a bigger turnout (entries) this year. . . . *N8PVT*. How about getting a separate category for YLs? Thanks for the fun. . . . *NØQXZ*. Hurricane Bertha put a damper on things (5 1/2 inches of rain) and 2 meter antenna came down. . . . *KE1FE*. Biggest thrill was working stations in EO01 and EO21. . . . *N8ZJN*. I hiked with a 45 pound backpack full of gear right out my front door to a 2771 foot mountain above the San Fernando Valley in Los Angeles to work the contest. . . . *WA9STI/6*. This was my first contest. . . . *KC8BDB*. My two contacts were the only two people I heard on direct the whole weekend. If repeater contacts had counted, I could have counted a VE2 I worked. Turned out that he was on the 10 meter link. . . . *NØOBF*.

No propagation but more local activity so a good contest anyway. . . . *KB5IUA*. Best DX: N4TJ, 6685 km. . . . *PA6SIX*. Surprised at the complete lack of interest in the Montreal VHF community in this contest. . . . *VE2SHW*. For my first contest my father (KBØRPL) and I built a 6 meter quad from sticks—thus the sticks meter antenna (also known as Caveman Quad). . . . *KBØWWG*. One of the worst things was when 10 minutes before the contest the wind sent my 2 meter four-element quad crashing to the ground. I'm glad I bought my Yagi! . . . *KE6QXV*. Six new grids out of such poor conditions made my day. . . . *K8OOK*. Sure do wish that there would have had more stations that two days; too nice outside weather here in MN to have the VHF contest. However, did have fun otherwise. Maybe next contest will be better! . . . *KBØLYL*. Rather slow in the northwest. Could not get to altitude because of snow drift near 8000 feet. . . . *KA7MFM*. My biggest thrill was working a friend made on the Internet in EN34, KBØZQ. Downside, FT 221 quit with four hours to go! Had fun! . . . *N9TZL*. ■

KA7MFM operating portable in DN15 at the end of a long contest. (Photo via KA7MFM)

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Power Curve -- typical BD-35 output power							
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Watts Out (440 MHz)	*16*	*26*	*32*	*35+*	*35+*	*35+*	*35+*
Watts In	*1*	*2*	*3*	*4*	*5*	*6*	*7*

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Power Curve -- typical B-34-G output power								
Watts Out	*18*	*30*	*33*	*35+*	*35+*	*35+*	*35+*	*35+*
Watts In	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*

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160 Watts on 2 Meters!

B-5016-G

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Suggested Retail

MIRAGE RUGGED!

Power Curve -- typical B-5016-G output power								
Watts Out	*130*	*135*	*140*	*145*	*150*	*155*	*160*	*165*
Watts In	*20*	*25*	*30*	*35*	*40*	*45*	*50*	*55*

The MIRAGE B-5016-G gives you 160 watts of brute power for 50 watts input on all modes -- FM, SSB or CW!

Ideal for 20 to 60 watt 2 Meter mobile or base. *Power Curve* chart shows typical output power.

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CIRCLE 143 ON READER SERVICE CARD

1996 CQ WW DX SSB Contest High-Claimed Scores

The following are raw scores only and are subject to verification.

WORLD SINGLE OPERATOR ALL BAND

ZD8Z	11,535,504
P40E	10,710,765
P40W	10,200,897
9Y4H	9,821,220
3V8BB	9,574,320
8R1K	7,435,368
4V2A	7,051,770
GIØKOW	6,030,094
FG5BG	5,925,927
V85HG	5,911,605
EA9IE	5,647,181
5NØMVE	5,458,896
AH7G	5,282,604
CI3EJ	5,187,855
5N36T	5,165,186
FR5DX	4,843,744
S50A	4,473,130
3DAØNX	4,234,155
UT7EZ	4,074,224
YT1AD	4,011,408
K5ZD/1	3,966,350
DU9RG	3,726,692
ZS6SA	3,697,628
YU7AV	3,678,538
KM9P/4	3,602,895
VP9ID	3,600,766
IO4LEC	3,510,630
DJ4PT	3,392,928
V47KP	3,358,929
YB1AQS	3,247,398
TM2V	3,226,720
N6BV/1	3,183,678
A71CW	3,150,900
UT4UZ	3,100,734
YV5AMH	3,095,792
K3ZO	3,083,400
YU7BW	3,011,250

28 MHz

PQ5W	725,868
LU6ETB	541,872
ZP6CC	482,040
LU4HAW	409,625
LU3FZW	300,390
LU1MA	248,076
9HØA	230,115
LU2DW	218,155
LU4VZ	215,565
CT4NH	165,633
IG9/IT9NJE	153,510
LU3FMR	144,837

21 MHz

ZX5J	3,131,170
AY7D	1,415,680
CT1BOP	1,114,236
AH8A	907,326
ZP5MAL	815,496
LU2QC	756,465
IK4GRO	689,120
S59A	682,570
LU9MBY	682,539
KC2X/4	649,600
F5NBX	610,006
S50U	601,896
4X/OK1JR	557,906
JI2UNR	547,630
IG9/IT9EQO	532,224
YU1KX	505,940

14 MHz

D25L	2,286,960
OK1RI	1,442,688
5B4MF	1,328,624
CE3F	1,317,137
IT9BLB	1,172,000
IG9/IK2QEI	1,154,250
9Y4NZ	1,146,498
JH7DNO	1,126,762
MI6I	1,075,221
YW1A	1,066,947
K2SS/1	1,010,709
VA7A	992,096
YT1BB	888,186
OZ7X	872,784
PR4Y	860,300
JH5FXP	854,501
OI1JD	800,436
OI4OC	796,924
GM6X	787,270
WT1S	772,161
VA3MM	769,596
S57DX	762,420
VA3MG	739,632
K2HFX	735,769
VP2E	725,648
NI8L	709,882
W7RM	705,500

7 MHz

IG9/IT9GSF	1,162,095
9M8R	873,824
IR4T	771,490
LZ5W	676,192
9Y4VU	623,790
AY1I	603,200
S50C	555,582
9A4D	546,638
YT7A	514,518
S53EA	472,752
HA9BVK	457,724
S57AL	444,012

3.7 MHz

EA8AH	894,280
IG9/I4UFH	838,980
P49I	483,585
K1ZM/2	306,578
UA2FJ	263,676
FM5BH	237,492
YTØT	211,456
RW9USA	201,308
9A7A	187,450
IU2X	181,984
LA9VDA	181,585

1.8 MHz

IG9/IV3TAN	453,248
CG1ZZ	102,312
YU1ZZ	78,090
OK1AY	69,599
S54DL	66,640
SM6DOI	53,946
SV8CS	50,920
OZ3SK	45,716
G3XTT	45,041
LZ2CJ	42,159
SP6HEQ/p	41,646

LOW POWER ALL BAND

TA4ZM	3,357,644
LTØA	2,719,360
LP7N	2,202,765
CT3/OH6LI	1,682,898
TR8IG	1,534,104
WA4ZXA	1,449,225
9G1BJ	1,434,710
G4KIV	1,255,128
EK4GK	1,230,925
IR4R	1,145,000
AC1O/4	1,121,354
LU8HLI	1,062,591
VU2PAI	1,053,420
VE3KZ	1,053,290
VU2MB	1,042,166
LY3BA	1,036,950
AA3OC	1,009,390
KØEJ/4	939,790
ON5GQ	915,610
EW2WP	914,305
NY3Y	913,991
WA1S	857,808
S51FA	835,499
EA3BKI	823,900
S51FA	822,606
DL2OBF	813,279
YL8M	809,523
DK2OY	804,332
KQ3V	780,579
JEØUXR	753,033
VA3DX	732,978
XE/WA2C	716,280
EA3ELZ	715,715

28 MHz

CX8CP	289,599
LU9HZS	282,264
LU9VY	213,600
LW2DBM	206,617
ZD8DEZ	178,911
4X1VF	176,900
PY2SR	165,834
LU3HWE	158,079
PU2MHB	157,459
LU4FCZ	143,514
LU5UL	136,754
VP2VF	119,394
LW6EQG	117,400

21 MHz

4Z4T	865,094
LU7FJ	735,124
RQ4L	637,014
SØ1M	535,704
CN8NK	525,735
S57J	315,185
LU5VC	299,778
YO3JF	282,080
YV4GAC	279,730
IR6W	265,680
EA8KL	243,474
SP3SLA	240,000
F5PGP	226,366
EA7GTF	221,949
EC3AIC	204,468

14 MHz

IY4M	807,764
4A1FEC	723,040
XO7A	682,620
IR9B	540,799
LU5FCI	531,520
YU7BJ	463,386
Z30M	423,948
XE1L	346,249
IV3FSG	299,550
PY2PD	291,575
DU1COO	282,039
S57T	272,880
DU3RCM	271,064
U5WF	260,208
ZF2DR	241,472
IR2R	234,243
JA1YBK	203,375
JR4PMX/1	202,275

7 MHz

S54ZZ	213,194
EA3BD	129,105
TMØZK	104,544
UA4LL	89,964
S5ØO	87,780
S54A	81,125
SP9NLK	72,910
4N1A	71,022
Z31GX	62,865
SN6O	58,968
JK3DGX/3	51,306
KH6/K6GSS	47,750
UR7TA	47,532
TX8FU	45,144

3.7 MHz

9A4RU	102,885
KH8AL	57,050
9A3QK	51,587
IQ5Q	50,232
IT9THD	46,720
VP2E/WB5CRG	43,416
OK1FPS	41,331
YV4AZF	40,468
S57CBS	40,158
YU1BL	37,206
OL3Z	36,992
S58J	33,932
OM5KM	31,947

1.8 MHz

S54E	38,871
HA8BE	35,644
OK1FFU	24,274
DJ9LJ	19,668
GW6J	17,936
IK4LZH	17,629
PA2SWL	14,168
SM7VZX	12,596
LY2OU	11,750
RA6LW	10,504
G3KWK	10,192

QRP ALL BAND

RZ6LJ	1,033,410
F5BEG	540,756
YU1EA	362,212
N1AFC	352,764
EA1GT	312,202
AA2U	306,504
YU1KN	280,576
UR5UW	163,530
KA1CZF	158,148
UA9ACJ	149,730
SP7LZD	148,824
KØRI	106,863

ASSISTED ALL BAND

CT3FN	8,025,360
LY5A	6,129,072
7P8/OE2VEL	5,025,600
KE3Q	3,049,136
AA1K/3	2,936,609
IR2W	2,752,983
KS1L	2,748,715
K3NZ	2,567,504
K3WW	2,546,972
DLØWW	2,542,640
N3AD	2,514,969
K1KP	2,429,690
N3RR	2,380,424
K2TW	2,119,208
JH7PKU	1,812,800
DL3KDV	1,796,080
NN3Q	1,752,394
W1GD/2	1,688,500
W1HP	1,652,739
WB2NQT/4	1,631,126
IU2M	1,624,145
DL2NBU	1,542,350

MULTI-OPERATOR SINGLE TRANSMITTER

ZXØF	21,762,636
HC8N	18,119,584
EA8ZS	12,451,320
CT3BX	11,971,638
8P9Z	11,638,352
4M5X	11,605,497
IQ4A	11,181,170
PJ9T	8,850,992
TM1C	8,279,595
TM2Y	8,225,963
HG1H	7,828,380
VP5DX	7,718,800
FY5KE	7,591,176
SN2B	7,560,432
WP2AHW	7,059,940
LZ9A	6,961,757
NH2C	6,902,467
ED9EA	6,851,362
ON4UN	6,695,136
OK5W	6,652,959
CT8T	6,404,398
OI2E	6,393,266
KF2ET	5,760,867
RU3A	5,750,920
XE2DV	5,534,754
DFØHQ	5,382,745
IU4U	5,351,654
ZPØR	5,285,215
RW2F	5,266,880
UU5J	5,241,660
RWØA	5,203,800
3E1DX	5,141,975

MULTI-OPERATOR MULTI-TRANSMITTER

PJ9E	34,483,968
V26B	26,995,888
TK1A	18,355,437
9A1A	16,826,880
M6T	14,181,275
VB9DH	13,376,979
OT6A	12,675,023
J3A	12,580,540
KC1XX	11,017,212
N2RM	10,943,290
K3LR	10,587,726
W3LPL	10,364,188
HCØE	10,157,134
JH5ZJS	9,970,840
LU4FM	9,952,821
XX9X	9,829,372
S53M	9,595,665
W2PV	8,620,248
VP5T	8,374,164

EUROPE ALL BAND

GIØKOW	6,030,094
S50A	4,473,130
UT7EZ	4,074,224
YT1AD	4,011,408
YU7AV	3,678,538
IO4LEC	3,510,630
DJ4PT	3,392,928
TM2V	3,226,720
UT4UZ	3,100,734
YU7BW	3,011,250
GW4BLE	2,987,325
IO6F	2,810,119
UTØD	2,482,597
OHØMM	2,373,623
EA3FQV	2,271,792
OH1EH	2,065,100
RN6BY	1,923,208
DL8PC	1,911,420
S59ZA	1,889,599
IT9STG	1,829,280
DJ6QT	1,787,013
DL2DXX	1,763,019
F6HLC	1,680,525
OM8A	1,676,829
OI6YF	1,588,945
IU2E	1,532,104

28 MHz

9HØA	230,115
CT4NH	165,633
I8KPV	98,450
S51AY	83,528
IK5QGO	82,716
IK4GNH	68,400
EA7BA	64,746
UT1IA	57,225

21 MHz

CT1BOP	1,114,236
IK4GRO	689,120
S59A	682,570
F5NBX	610,006
S50U	601,896
YU1KX	505,940
S53R	491,232
OI1AF	342,552
IR4B	325,483
UX4UM	323,700
LY3BH	287,063
YR2R	280,755
DL1AZZ	272,259

14 MHz

OK1RI	1,442,688
IT9BLB	1,172,000
MI6I	1,075,221
YT1BB	888,186
OZ7X	872,784
OI1JD	800,436
OI4OC	796,924
GM6X	787,270
S57DX	762,420
LY5W	682,825
IR5T	606,884
S56A	574,398
EA2IA	553,280
RU1A	521,365
OZ9Y	511,836
YZ7ED	503,937

7 MHz

IR4T	771,490
LZ5W	676,192
S50C	555,582
9A4D	546,638
YT7A	514,518
S53EA	472,752
HA9BVK	457,724
S57AL	444,012
EN6Q	373,968
ON4AYM	300,472
OE8SKQ	273,156
4O4D	194,375
RA4AG	192,336
UR7E	190,430
LY3BX	154,132

3.7 MHz

UA2FJ	263,676
YTØT	211,456
9A7A	187,450
IU2X	181,984
LA9VDA	181,585
LY6K	179,170
UY5ZZ	144,960
IN3QBR	139,874
DL3LAB	135,269
IV3YYK	132,253
S58WW	129,896
ES7RE	126,540
G3WGN	125,350

1.8 MHz

YU1ZZ	78,090
OK1AY	69,599
S54DL	66,640
SM6DOI	53,946
SV8CS	50,920
OZ3SK	45,716
G3XTT	45,041
LZ2CJ	42,159
SP6HEQ/p	41,646
LY2BR	38,430
YL2SM	30,180

LOW POWER ALL BAND

G4KIV	1,255,128
IR4R	1,145,000
LY3BA	1,036,950
ON5GQ	915,610
S51FA	835,499
EA3BKI	823,900
S51FA	822,606
DL2OBF	813,279
YL8M	809,523
DK2OY	804,332
EA3ELZ	715,715
YU7CB	654,345
SP2QCH	638,314
S51IX	634,648
DJ5BV	601,084
OH4JFN	561,925
RU6BV	505,344
CQ1BWW	499,380
IK4MTF	494,520
SP6NIC	478,552
LY2FN	425,712
YO4CIS	413,875
RA3WA	406,700
SM3PZG	401,495
IK2XYI	382,044

28 MHz

CT1ELP	84,095
CT1ESO	68,195
EA7HBP	57,780
EA7FIU	51,888
EA3FCQ	45,235
OM5FA	33,573
I2ARC	27,370
DL4RCE	20,925
LZ2GS	20,574

21 MHz

RQ4L	637,014
S57J	315,185
YO3JF	282,080
IR6W	265,680

Say You Saw It In CQ

SP3SLA	240,000
F5PGP	226,366
EA7GTF	221,949
EC3AIC	204,468
9A5Y	198,062
OK1ARI	163,701
DJ9ZB	146,740

14 MHz

IY4M	807,764
IR9B	540,799
YU7BJ	463,386
Z30M	423,948
IV3FSG	299,550
S57T	272,880
U5WF	260,208
IR2R	234,243
IV3UHL	185,058
F6OYU	147,960
S57U	127,000
DF7YU	119,370
UR4MS	113,190
EA3GHZ	111,027
EA1AKP	109,872
RV6LFE	109,434

7 MHz

S54ZZ	213,194
EA3BD	129,105
TMØZK	104,544
UA4LL	89,964
S50O	87,780
S54A	81,125
SP9NLK	72,910
4N1A	71,022
Z31GX	62,865
SN6O	58,968

3.7 MHz

9A4RU	102,885
9A3QK	51,587
IQ5Q	50,232
IT9THD	46,720
OK1FPS	41,331
S57CBS	40,158
YU1BL	37,206
OL3Z	36,992
S58J	33,932
OM5KM	31,947

1.8 MHz

S54E	38,871
HA8BE	35,644
OK1FFU	24,274
DJ9LJ	19,668
GW6J	17,936
IK4LZH	17,629
PA2SWL	14,168
SM7VZX	12,596
LY2OU	11,750
RA6LW	10,504
G3KWK	10,192

QRP ALL BAND

RZ6LJ	1,033,410
YU1EA	362,212
EA1GT	312,202
YU1KN	280,576
UR5UW	163,530
SP7LZD	148,824
UA6LKA	87,236
ER1FW	75,774
OH5NHI	64,200
UA4YJ	61,305
RA3DGH	34,780
OEM1KYW	27,485

ASSISTED ALL BAND

LY5A	6,129,072
IR2W	2,752,983
DLØWW	2,542,640
DL3KDV	1,796,080
IU2M	1,624,145
DL2NBU	1,542,350
ES5Q	1,491,322
II2A	1,441,440
OH5BM	1,384,460
IO4A	1,359,900
M6O	1,162,252
DKØEE	1,105,052

MULTI-OPERATOR SINGLE TRANSMITTER

IQ4A	11,181,170
TM1C	8,279,595
TM2Y	8,225,963
HG1H	7,828,380
SN2B	7,560,432
LZ9A	6,961,757
ON4UN	6,695,136
OK5W	6,652,959
CT8T	6,404,398
OI2E	6,393,266
RU3A	5,750,920
DFØHQ	5,382,745
IU4U	5,351,654
RW2F	5,266,880
UU5J	5,241,660

MULTI-OPERATOR MULTI-TRANSMITTER

TK1A	18,355,437
9A1A	16,826,880
M6T	14,181,275
OT6A	12,675,023
S53M	9,595,665
9A800OS	7,949,964
GM6V	6,901,412
R3AA	5,377,848
EA3FP	5,286,105
HBØ/HB9AON	4,314,002
LY7A	3,616,815
DK5EZ	3,168,578

UNITED STATES ALL BAND

K5ZD/1	3,966,350
KM9P/4	3,602,895
N6BV/1	3,183,678
K3ZO	3,083,400
K1IU	2,911,140
W3BGN	2,614,203
W9RE	2,553,226
K1RU	2,527,686
N2IC/Ø	2,304,484
KE9A/4	2,268,308
WZ4F	2,056,131
AA1ON	1,958,100
N7AVK	1,811,992
W1WEF	1,665,760
W6XR/1	1,647,555
W5WMU	1,441,350
K4PQL	1,362,550
KB8TI	1,259,440
N4UH	1,187,646
K5NA	1,170,190
K1HI	1,106,854
K6GX/5	1,027,650
AA4EL	1,027,036
N8ATR	1,015,388
N5DX	1,011,242
W9LT/8	1,010,321

28 MHz

K5XI	64,988
W4YV	47,058
WA3CGE	13,776
W6KFV	10,030
WA7KLK	5,908

21 MHz

KC2X/4	649,600
N4BP	357,588
K4JYO	310,367
N4CT	290,752
KS9U	232,650
WA2QNW	219,780
KE5FI	214,912
KF8EP	126,451
W3AU	121,930
W5ASP	111,750
WA8DXB	109,056

14 MHz

K2SS/1	1,010,709
WT1S	772,161
K2HFX	735,769
NI8L	709,882
W7RM	705,500
K3ZJ	426,758
K6HNZ	405,867
N3HBX	339,644
KI7DM	231,140
W5FO	224,656
N4PN	218,515
W8TWA	209,034

7 MHz

N7DD	310,638
WØUN	241,957
KVØQ	241,930
AI7B	152,640
W8JGU	95,940
KF2BH	65,056
N4DVW	64,790
NI2C	62,586
KD9ST	61,776
K8UNP/4	60,720
KF9YT	51,500
W6BCQ	50,616

3.7 MHz

K1ZM/2	306,578
K1UO	166,374
N6AR/4	134,284
AB6ZV/7	78,708
K9HMB	49,455
W8WW/4	34,568
N8II	13,878

1.8 MHz

WW2Y	14,809
KC8MK	10,290
AA4MM	8,692
W2VO	6,255
WB9Z	6,016
WA2IZL	5,371
K8RF	4,134
KØCS	3,024

LOW POWER ALL BAND

WA4ZXA	1,449,225
AC1O/4	1,121,354
AA3OC	1,009,390
KØEJ/4	939,790
NY3Y	913,991
WA1S	857,808
KQ3V	780,579
WA7BNM/6	672,600
WD5K	654,368
KJ4WH	526,729
WA6KUI/4	525,200
N9VVV	521,550
WS1A	463,854
KR4QI	451,191
N2INN	444,600
KC6ETY	427,682
KB2QWO	378,105
WR4K	375,092

28 MHz

KB5ZFO	20,350
KC3PZ	18,630
N8FWA	9,540
N2TDT/3	5,520
WA7NIY	4,785
N2QWR	4,455
KE8NH	3,306
WBØGFV	2,184

21 MHz

AI2C/4	96,728
KJ6HO	90,155
WR3L	79,002
W6EUF	68,355
NW7Q/Ø	63,960
W1XK	55,170
AC6WD	15,620

14 MHz

K1VUT	188,727
N4MO	170,107
NI5M	154,070
W7FP	142,692
K2MFY	141,700
KB8IBS	108,720
NZ5O	105,164
K3SWZ	98,760
W5VGX	78,975
AAØMQ	75,512
K2BQW	68,112
KG7RZ	45,236
WB2ZMK	27,132

7 MHz

WB2ZTH	22,659
WW3S	21,762
W2FGY	11,407
W3CPB	6,435
N2ALE/6	440

3.7 MHz

W1MK	2,016
AF8C	252

QRP ALL BAND

N1AFC	352,764
AA2U	306,504
KA1CZF	158,148
KØRI	106,863
WB3ECU	40,584
W8QZA/6	40,040
NZ5A	37,973
N8AXA	28,792
WØHEP	6,132

ASSISTED ALL BAND

KE3Q	3,049,136
AA1K/3	2,936,609
KS1L	2,748,715
K3NZ	2,567,504
K3WW	2,546,972
N3AD	2,514,969
K1KP	2,429,690
N3RR	2,380,424
K2TW	2,119,208
NN3Q	1,752,394
W1GD/2	1,688,500
W1HP	1,652,739
WB2NQT/4	1,631,126
AA3HA	1,483,000
KS9Z/1	1,468,896
AA3JU	1,415,025
N2IWE	1,400,960

MULTI-OPERATOR SINGLE TRANSMITTER

KF2ET	5,760,867
N3RS	4,718,196
K4ISV	4,558,788
K1NG	4,367,250
K8LX	2,959,128
K5MR	2,914,735
WA2VUY	2,889,270
K1RX	2,779,348
W5KFT	2,755,625
KØRF	2,491,060
WXØB/5	2,247,842
KB1H	2,203,449
NU2W	2,168,265

MULTI-OPERATOR MULTI-TRANSMITTER

KC1XX	11,017,212
N2RM	10,943,290
K3LR	10,587,726
W3LPL	10,364,188
W2PV	8,620,248
K1KI	7,262,196
KY3N	6,995,142
W1FJ	6,703,900
N4ZC	6,437,616
AA1AS	6,243,224
W4MYA	5,604,870
KS9K	4,814,654
NQ4I	4,541,284
W2AX/1	4,234,579
N6AW	3,939,562
W4IY	3,843,203

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CIRCLE 82 ON READER SERVICE CARD

Here's a neat idea to increase the flexibility of your IC-706 to include the use of older amplifiers.

A Linear Amplifier Keying Circuit For The IC-706

BY JOHN S. SEYBOLD*, K4PRC

In addition to mobiling with my ICOM IC-706, I was also interested in using it as a second rig in the house. In fact, the compact nature of the IC-706 opens the door to all kinds of different operating environments.

It occurred to me that with a moderate run of coax I could set up the rig with a power supply in the living room (temporarily, not wanting to offend my XYL) so that I could use the radio while reading or watching TV. Of course, once I had gone this far, it seemed only reasonable to hook it up with my linear, band conditions being what they are lately. Imagine being able to run a full kilowatt without listening to the roar of that cooling fan or being chained to the desk! All I would need is a moderately long run of audio cable for keying the relay and I would be in business—or so I thought.

Unfortunately, many of the newer HF rigs cannot directly key an external linear amplifier even though they do have a *send* output signal available. In the case of the ICOM IC-706, the rig may key a modern linear directly, but the relay contacts in the 706 are only rated at 20 ma, much below the required coil current for most linear TR relays. In my particular situation, I have an Ameritron AL-80A linear amplifier which has a 12 volt relay coil that requires approximately 180 ma of steady state current. Had I wired the IC-706 send line directly to the linear, the relay in the 706 would not have lasted too long before the contacts burned up!

The solution was to build a solid-state switching circuit to do the job, one similar to that presented in the November 1995 issue of *QST*. I wanted something that would be inexpensive and use readily available parts, would not require an external power source, and would not add in any appreciable delay when keying up. I also did not want to add any more relay chatter to my shack.

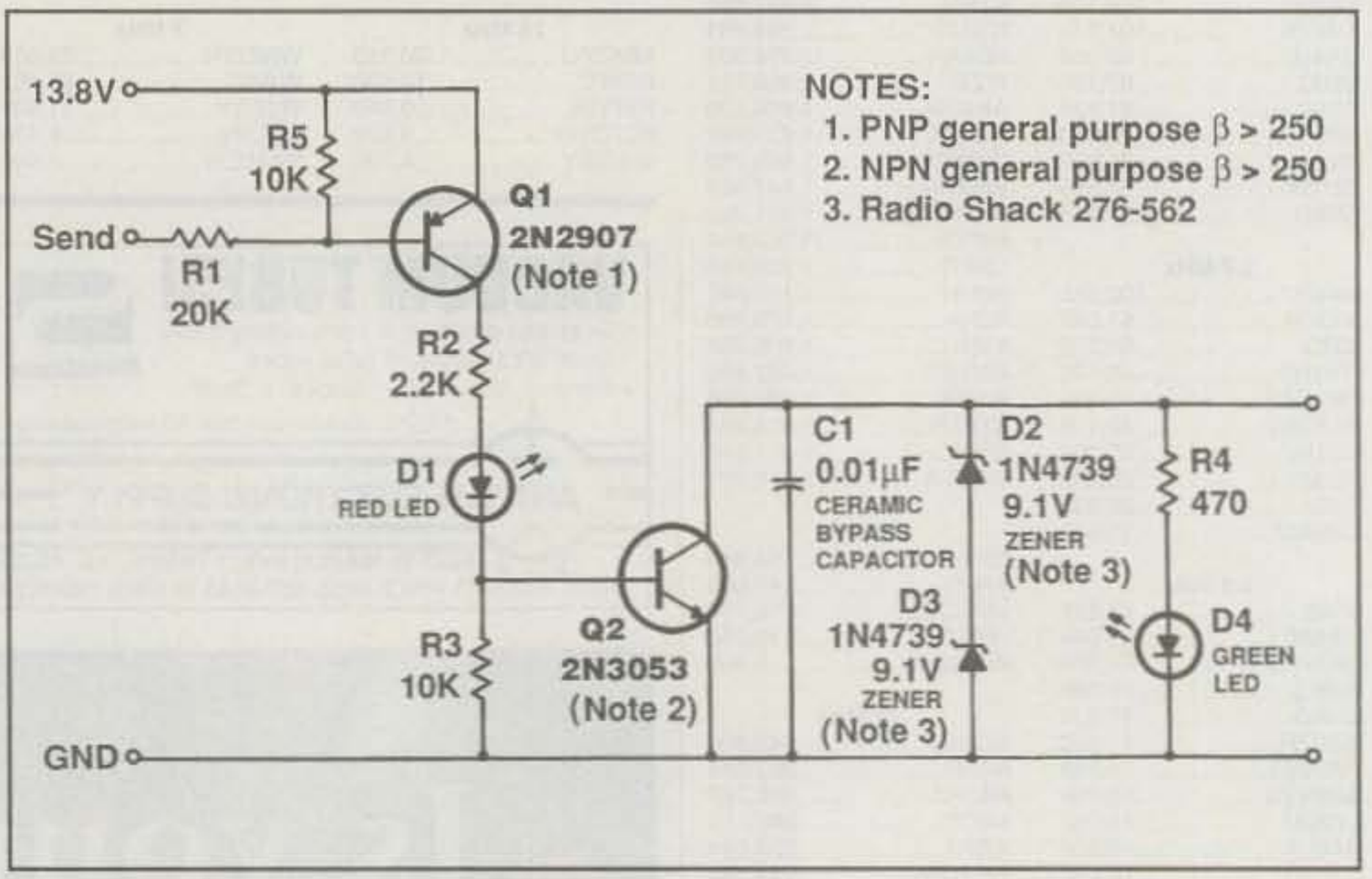
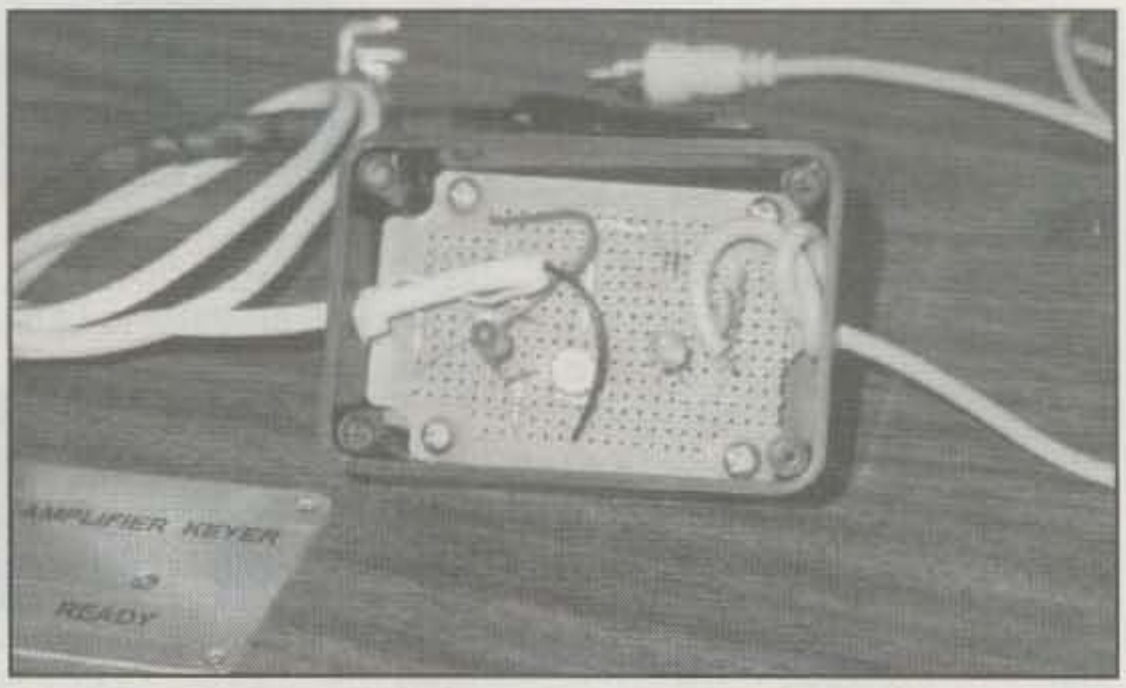


Fig. 1– Schematic diagram for the linear amplifier keying circuit.

Fig. 1 shows the schematic diagram of the circuit. The small amount of bias current that is required is drawn from the 12 volt output of the IC-706, which is available from the same plug as the *send* signal. This circuit is designed to switch a 12 volt relay, with coil current less than 600 ma. Note that it will *not* work for any linear

*1808 Wind Harbor Road, Orlando, FL 32809

The finished unit is housed in a small utility box.



The interior view shows the simple point-to-point wiring done on a small piece of perf board.

A Helpful Hint

Here is a helpful method for feeding coax into the shack without leaving a window open. The board is a 3 inch fir strip painted to match the interior and exterior wall. The holes are 5/8 inch and the connectors are 3 inch bulkhead connectors with oversize washers. The gap at the top of the lower window section can be sealed with some form of insulation or a piece of fabric. If the installation is on the ground floor, be sure to add some window locks to the tracks for security. It is also a good idea to waterproof the exterior coax connectors. While not shown in this photograph, the shield of each connector is grounded from the outside. You could also run a stud through the board to provide a convenient shack ground.

that uses a 120 volt relay, and the circuit will have to be modified if the DC voltage on the relay is anything other than 12 volts.

This project can be assembled in a couple of hours using junk-box parts. The actual transistors can be almost any bipolar PNP and NPN general-purpose transistors with hfe greater than about 50 (100 is even better). Just make sure that the NPN transistor can handle the necessary current for the relay. I added the LEDs to make the circuit a little more interesting, but they, along with R4, can be removed without affecting circuit operation.

D4 is a green LED that is lit by the open circuit voltage that is present at the *send* line of the linear amplifier. This provides a visual display that the linear is ready to transmit. D1 is a red LED used to indicate that the circuit is active, essentially serving as an additional *transmit* light. C1 and D2 and D3 serve to protect Q2 from the inductive voltage spike that occurs when the relay is opened.

Circuit operation is as follows: When the send line of the IC-706 goes low, indicating transmit, Q1 is turned on, which permits current to flow through D1 and Q2. When Q2 is activated, it grounds the output of the circuit, activating the linear amplifier. The value of 20 KΩ for R1 limits the base to emitter current of Q1 to about 0.7 ma. With an $h_{fe} > 50$, Q1 will permit up to 35 ma to flow between its emitter and collector. Thus, $V_{ce} \approx 0$ and the base current of Q2 is determined by R2 and the voltage drop across D1 (~0.7 volts) and the voltage drop between the base and emitter of Q2 (~0.7 volts). The base current of Q2 is approximately 6 ma. With an h_{fe} of > 50, Q2 will sink 300 ma. The particular component that I used had a measured $h_{fe} > 100$, which I expect is not uncommon, thus permitting up to 600 ma to be handled at the output, which is close to the maximum I_{ce} for my transistor. D2 and D3 are both 9.1 volt Zener diodes, which are wired in series to clamp the voltage across Q2 to 18.2 volts. This provides protection for Q2 from the relay coil voltage surge that occurs when the relay is de-energized.

Using the DIN plug that is supplied with the IC-706, I built the circuit into a small project box as shown in the photo. As seen in the photo, the circuit was wired using a small piece of perfboard. The lack of any significant reactive elements in the circuit make it very fast, so there is no appreciable delay in operation. The overall current draw at the input is less than 1 ma, well below the 20 ma rating of the IC-706 *send* relay. As mentioned earlier, the output can safely sink 600 ma. Using a larger output transistor with a heatsink would permit even larger output currents if necessary.

Now when I set up my remote operation in the living room (or, for that matter, when I am in the shack), I can run my linear with the IC-706. The green LED lets me know that the linear is in the ready position, and the red LED indicates when it is being keyed. This circuit is small, lightweight, and convenient to use—overall a nice addition to the shack. ■

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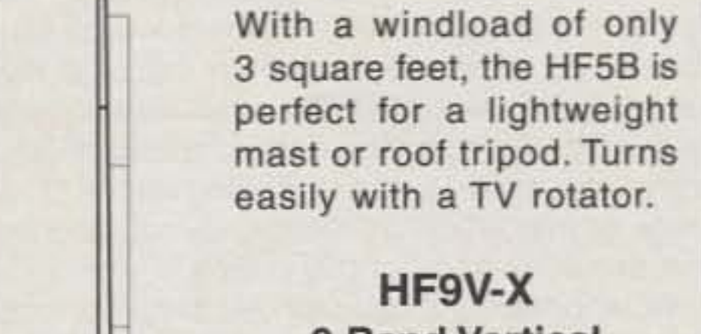

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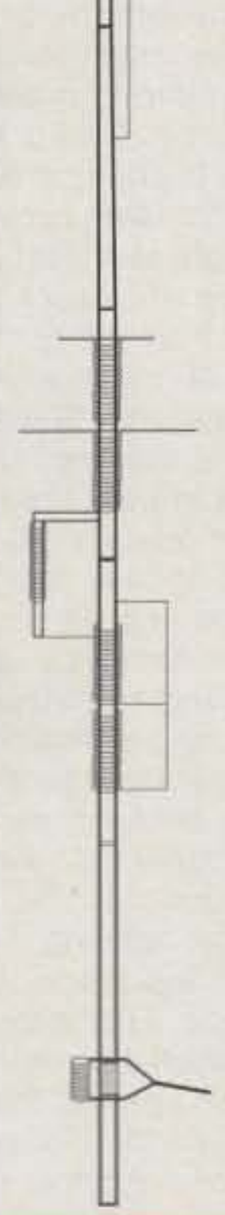

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CIRCLE 28 ON READER SERVICE CARD

The challenge to rotate the 160, 80, or 75 meter box antenna in the author's introductory article has resulted in a switchable bi-directional modification giving full azimuthal coverage with gain. On a scale of 1 to 10, the DX ability of this low-band antenna goes from a 5 (half the world) to a 10, and 40 meters is included.

The Rotating Box Antenna

BY TIMOTHY P. HULICK*, PH.D., W9QQ

In the January 1997 issue of *CQ*, the new box antenna configuration for the low bands was presented as a superior DX performer offering 10 dB of gain over a dipole at a height of 40 feet on 80 meters. Directivity of the antenna showed that it had gain over more than 180 degrees of azimuth on 80–75 meters (see Jan. '97 *CQ*, p. 10, fig. 2). Based on the wide azimuthal gain coverage of this antenna, a simple reversal of the radiation pattern would ensure some gain at all azimuths. Taking up the challenge of that article by electrically rotating the antenna is the subject this month.

Rotating doesn't mean physically picking up the entire structure and passing it through every tick mark on the compass by some mechanical platform. However, it does mean electrically steering the radiation pattern to maximize gain in a particular direction. Unlike a highly directional Yagi antenna, the horizontal pattern of the box is half the azimuthal circle compared to the dipole at a height of 40 feet.

Since the first article appeared in January, I have received many questions from the general readership of *CQ*. My e-mail and regular mail have addressed these questions. Some who actually built the antenna in the dead of winter reported superior results in both front-to-back ratio and gain over the reference dipole. One to seven S units of F/B have been reported, while gain has checked in at zero to three S units (that's 18 dB!). Performance at any given moment depends on angle of radiation (reception), which is a strong function of distance and the mood of the ionospheric gods. In no case was the box antenna ever reported as having produced a weaker signal than the dipole for contacts over 3500 miles.

Many have asked for 40 meter antenna dimensions. They are included in this article in Table I near the end of this article. This is the uppermost frequency band on which the box is effective, however. For those who expect the antenna to outperform the Yagi on the higher bands, you have missed the point! Against a Yagi of any kind on the high bands, the box is a miserable performer. Remember that this antenna works in a superior fashion against the typical competition on the low bands not because it is so good, but because the alternative is so bad! It has negative gain against the Yagi on the higher bands compared to the typical competition, which is the three-element monoband Yagi.

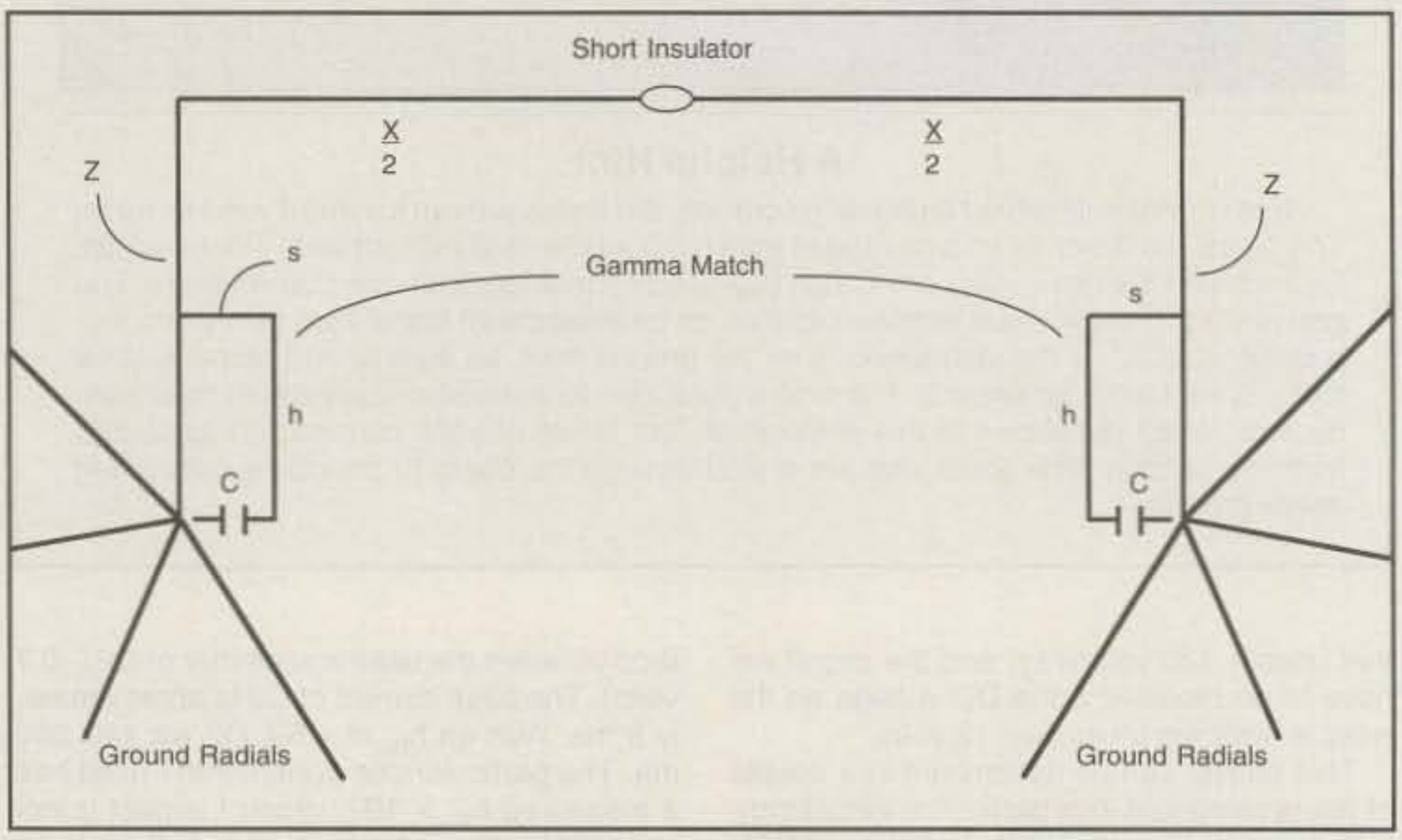

Fig. 1– To obtain direction reversibility, each vertical element must have the capability of being the "radiator" or "reflector." Only one element is driven at a time (gamma match is active), while the other element is a parasitic reflector. Reversing the roles of each allows complete reversal of the radiation pattern.

Others have noticed that the box antenna may be fed directly without a gamma match by breaking the vertical run at the ground connection and inserting the coax line. There is nothing wrong with this if you are satisfied with a best VSWR of 1.9. A tuner would be of help, as it would provide a way to get the RF into the antenna. It doesn't matter what the matching device is as long as it is essentially lossless.

Still others have wondered about rotating the box antenna. I have received some really wild ideas by e-mail, and all of them were checked out by simulation on the computer to see if they had any merit. W4JVN had the right idea: include the necessary switching and construction to allow the reflector to become a driven element and the driven element to become a reflector. It worked.

The physical solution is simple. Move the coax feed to the original reflector through its own added gamma match and disconnect the coax to the original driven element by relay so that it can function as a reflector. The pattern is reversed for full 360 degree coverage in two 180 degree steps.

Understanding Rotation

Review that first *CQ* article and mentally make both vertical elements a combination radiator/reflector. You might come up with something like fig. 1. If you want gain going to the left of the page, feed the element on the left. If you want gain going to the right of the page, feed the element at the right. The unfed element remains open circuited at the feedpoint. This is important because it is necessary to electrically disconnect the coax to the feedpoint of the

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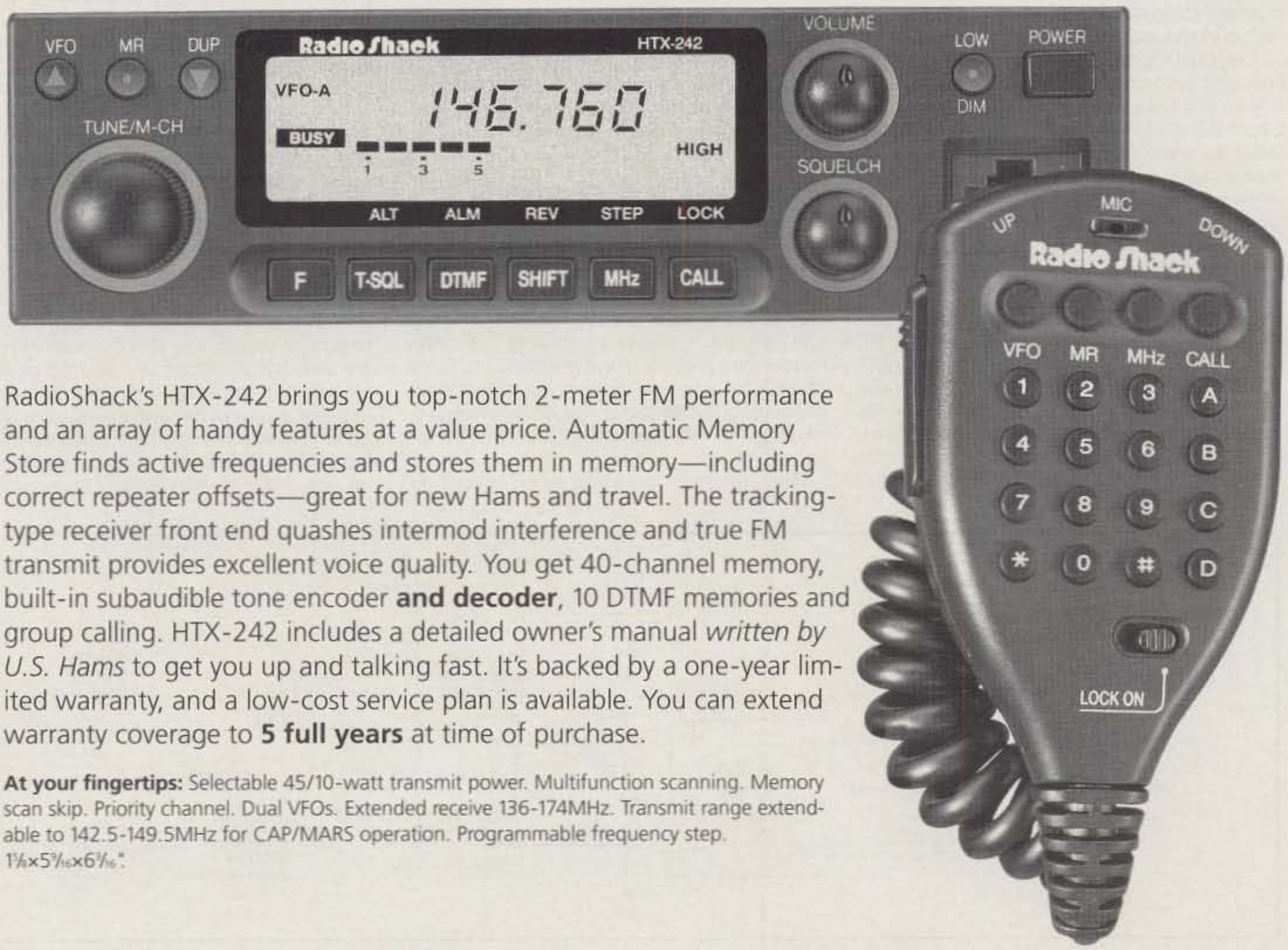

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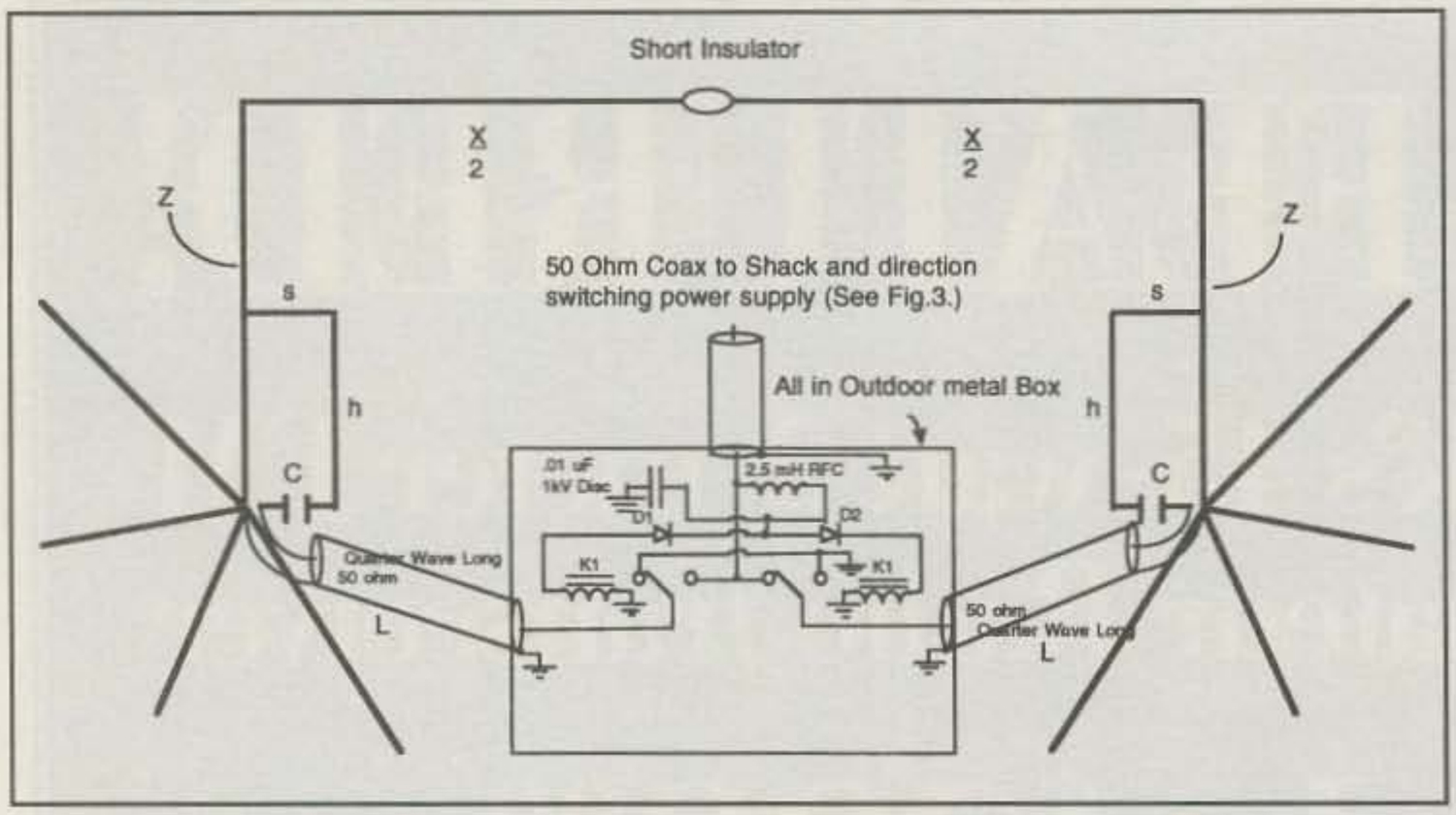


Fig. 2– Dimensions for each band may be applied to X, Z, s, h, and C from Table I. Notice that the maximum height for 160 meters is 70 feet, while that for 80, 78, or 75 meters is 35 feet. The 40 meter band requires 17 feet of height. K1, D1, D2, and L are discussed in the text. The RF choke and disc ceramic capacitor prevent transmit RF from finding its way to the relay coils, allowing only DC switch commands.

reflector. Analysis shows that shorting the feedpoint of the gamma match on the reflector element causes the extra wire of the gamma match to detune the antenna.

Certainly it is not practical to actually change the coax feed point when a reversal of direction is required, but the requirement to open circuit the unused feedpoint gives a design criterion for some kind of switching arrangement. Remembering that a shorted length of transmission line one-quarter wavelength long looks like an open circuit at the other end is a clue to how to design a switching circuit that allows the unfed line to remain in the circuit.

Suppose that there is a shielded metal container located halfway between the two vertical runs of the box antenna with two SPDT switches inside and that a quarter wavelength of 50 ohm coax extends from each gamma match to the container. One switch connects either coax to the coax continuing to the shack so as to make it continuous all the way, or in its other position, it shorts the coax to ground. The other switch performs the same function as the first switch, except in reverse order to do the opposite function.

With this set of conditions, one gamma match is fed while the other is open circuited at its feedpoint. Reversing the switch reverses these connections and the radiation pattern. The box antenna has been rotated!

The Rotating Mechanism

Fig. 2 is a schematic diagram of the entire feed arrangement of the box antenna. Relay K1 is a latching type (e.g., Potter and Brumfield KUL11D15S-12) that snaps into either position without continuous voltage applied. Its direction may be reversed by pulsing a suitable momentary voltage to one magnetic coil or the other. The pair of single-pole double-throw contacts grounds the unfed coax while connecting the fed element to the coax to the shack.

The switching circuit suggested in fig. 2 deserves further explanation. Although the description of what is needed to do the switching has just been discussed, the actual implementation is not as obvious. In the schematic diagram of fig. 2, the coax is used to carry the switching signal and the transmit and receive RF. They must be decoupled from each other by proper design. Imagine that +12 volts DC is connected across the coax coming from the shack. Since it is DC, the current will find its way through the 2.5 mH RF choke and will forward bias D2, allowing current to pass through the right-hand coil of K1 to ground and return to the 12 volt source. The right coil of K1 is energized. The +12 volt source will also find its way to the right-hand gamma match, but will be blocked by gamma chip capacitor C, so that it is not shorted to ground. Now remove the +12 volt source and allow RF (at a frequency for which the antenna was constructed) from the transmitter to travel down the coax. It sees the 2.5 mH RF choke as an RF choke and is blocked from reaching the coil of K1. Further, any RF that does get through is shorted to ground through the .01 µF disc capacitor. Virtually no RF current passes through D2 (or D1), and the RF and DC are kept out of each other's way. If the polarity of the 12 volt source were reversed, current would not pass through D2, but would find its way through D1 and energize the left-hand coil of the relay, causing the latch to reverse direction.

To find the quarter-wavelength, L, in feet, of RG-8/U or RG-213 or 214/U coax in fig. 2,

$$L(\text{feet}) = 162.4/f(\text{MHz})$$

What happens at the relay box must be properly supported in the shack in order to cause proper switching of the latching relay and antenna rotation. The relay power supply and control circuit are shown in fig. 3.

This circuit is also built into a small metal enclosure with the reversing switch mounted horizontally on the front panel properly labeled E and W or NE and SW, or directions of your choice. Since the relay only needs to be pulsed, the switch is a momentary spring-loaded toggle type with center OFF. Its purpose is not only to pulse a current through the relay coil, but to determine which one gets the pulse by selecting polarity. The circuit is a simple unregulated power supply with polarity reverser switch

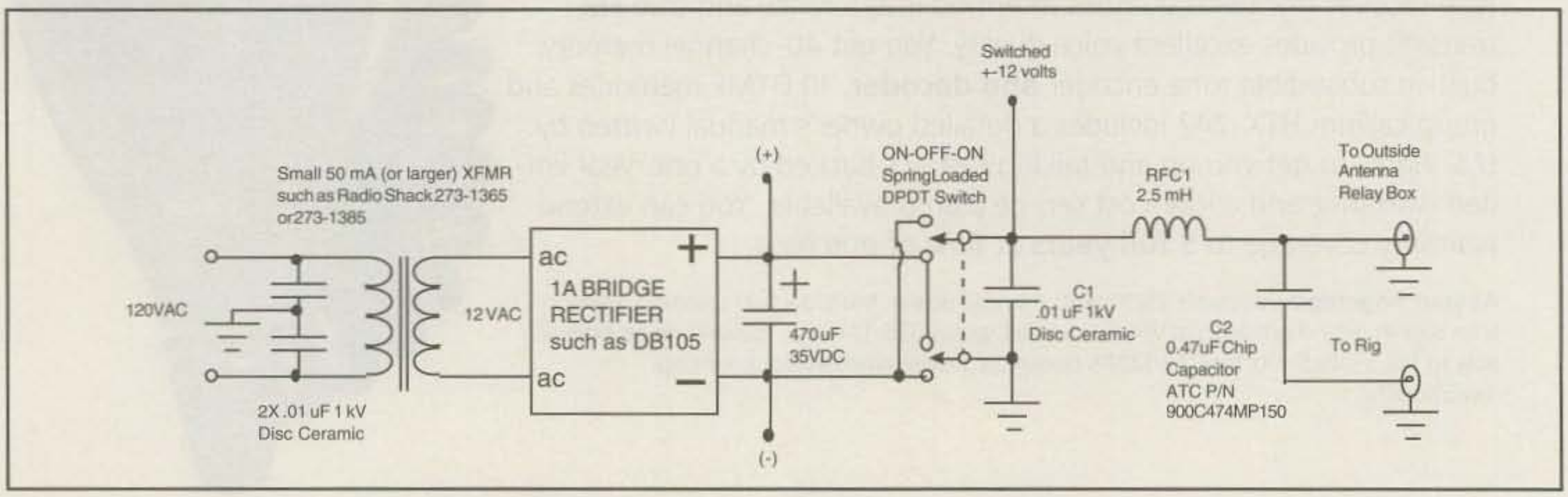
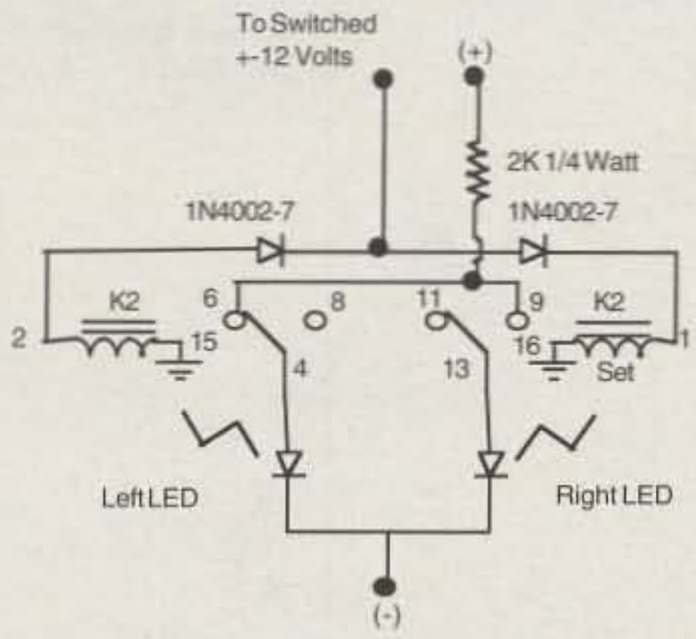
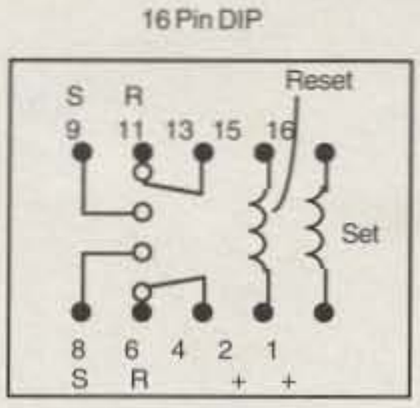


Fig. 3– This small power supply is used for pulsing the latching relay shown in fig. 2. It provides the DC necessary to switch its direction based on the polarity of the voltage sent down the coax. Twelve volts AC, when rectified and filtered, is more than enough to activate the relay. The coax is used to carry the DC to the relay. Therefore, all RF is decoupled from the power supply by means of disc ceramic capacitor C! and 2.5 mH RF choke RFC1. Chip capacitor C2 blocks the relay DC switch pulse from going to the rig and is of a type that easily can carry full legal limit RF current. The power supply may be built into a small metal box with two SO-239 connectors and mounted conveniently in the shack.





Suggested Relay for K2 is Potter & Brumfield T83S11D132-12 for 12 Volt Operation. S and R is the arbitrary assignment of Set and Reset.

Fig. 4– The direction indicator circuit shown is an optional add-on which shows the last position toggled by the spring-loaded switch in fig. 3. It does not provide positive feedback that the outdoor relay has actually changed position, since there is no connection to that relay. Each LED may be panel-mounted, one to the left and one to the right of the ON-OFF-ON switch. Relay K2 is a miniature version of latching relay K1. Which LED is actually right and which one is left may have to be decided experimentally after everything is built and tested.

and RF/DC separation circuit. The suggested power transformer is a 12 VAC 500 mA PC mount (such as RadioShack 273-1365) or chassis mount (such as RadioShack 273-1385). It is also possible to use an AC adapter (such as RadioShack 273-1652) if it is preferred to move the transformer and bridge rectifier out of the box and into the wall plug. The 470 µF filter capacitor may or may not be needed, depending on the adapter used. It certainly will not harm anything to use it in either case. The recommended latching relay is a 12 volt type, so the transformer must be matched up to the relay. Should a 24 volt relay be the only type available, then the transformer selection must be adjusted accordingly. The RF choke and C1 serve the same purpose as similar components in the relay box. C2 blocks DC from entering the receiver and transmitter, but passes the RF. No substitution should be made for C2, since it is designed like the other chip capacitors in the gamma matches to carry 15 amperes of RF current. It is also available from Chris Zielke at the M. Lader Co. (see Table I in the next section). The coax connectors on the power supply and the relay box are typical SO-239s.

The power supply circuit of fig. 3 does not provide a visible latched indicator showing in which position the antenna is, however. One must remember which way the toggle switch was thrown the last time. The circuit of fig. 4 offers a solution to this problem by providing a parallel switching indicator latching relay that is toggled simultaneously with the one switching the antenna direction in fig. 2.

It does *not* provide positive feedback that the antenna pattern is actually changed. Nothing at K1 in fig. 2 controls the relay, K2 in fig. 4. They are merely pulsed at the same time so that if K1 moved, it is trusted that K2 moved also. With only the one wire of the coax (and ground) that can be used to carry switching signals, RF, and indicator signals, it was decided that the multiplexing circuitry necessary to carry out three simultaneous functions is too complicated. The scheme of using simultaneously pulsed relays is adequately believable to indicate in which direction the antenna is pointing. The indicating circuit of fig. 4 is built into the

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7200	32.4	17.2	0.7	4.0	200	100E201JCA2500X

Note: The chip capacitor, C, made by American Technical Ceramics, may be obtained in single quantities from: M. Lader Co., 1495 Alan Wood Road, Conchohocken, PA 19428 (phone 610-825-3177 from 9–12 and 1–5 Eastern time; ask for Chris Zielke).

Table I– The physical dimensions of the box antenna, originally printed in the January '97 article, are repeated here. Forty meter band dimensions have been added, however. Gain on 40 over most of the band is about 7 dB above a dipole at a height of 40 feet.

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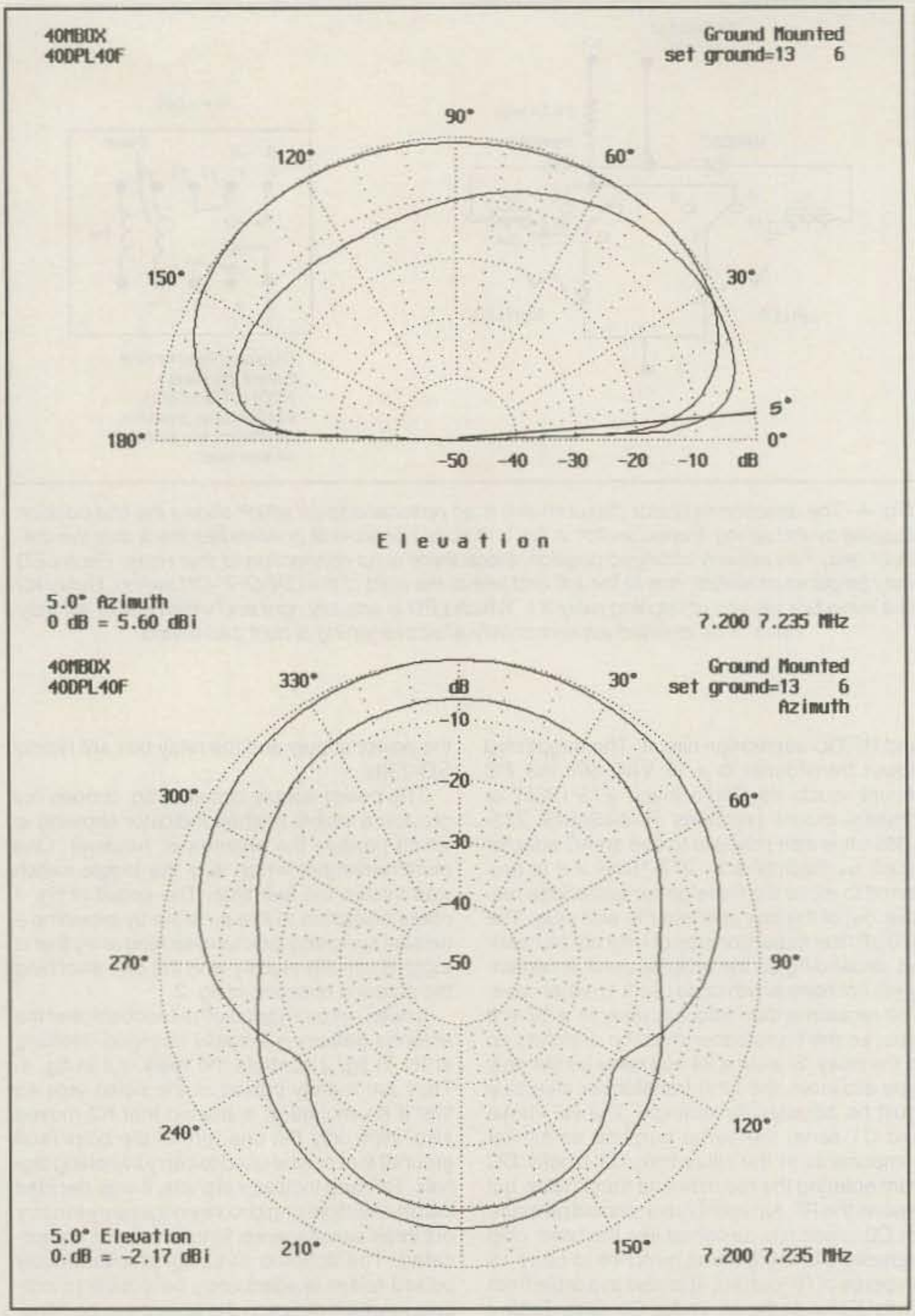


Fig. 5– Fig. 2 of the first article in the January '97 issue of CQ portrayed elevation and gain plots for the box antenna on 80 meters. In this presentation the same plots are included for the new 40 meter dimensions. Notice that because the dipole at the same height is more effective for an elevation angle of 5 degrees on 40meters than on 80 meters, the relative gain over a dipole is about 3 dB less on 40 meters.

power supply box of fig. 3. Relay K2 is a 16- pin DIP variety that may be built onto a common PC board with all of the components of figs. 3 and 4. DC connections for the circuit of fig. 4 are connected to like symbolized points in fig. 3.

About 40 Meters

All dimensions presented in Table I of that first article remain the same. Adding 40 meters to the list, Table I is reprinted in this article.

The elevation radiation pattern for 40 meters is shown in fig. 5(A), while the azimuthal pattern is shown in fig. 5(B). Both patterns are superimposed with that of the reference dipole and are meant to complete the set included with the first article in the January '97 issue.

Table II is a performance listing of the box antenna on 40 meters for every 25 kHz of the band based on designing the antenna to be centered at 7200 kHz. The comparison is like that of Table II of the first article.

The box is still a good performer on 40 meters, but the dipole at 40 feet above the ground is becoming more of a competitor on this band—hence the lower gain compared to the 80 meter version.

Reader Feedback

Since the first article appeared in the January '97 issue of *CQ*, the correspondence has been

Frequency in kHz	VSWR	Gain over Dipole (dB)	F/B (dB)
7200	1.96	5.95	5.02
7025	1.83	6.07	5.47
7050	1.70	6.20	5.96
7075	1.57	6.31	6.49
7100	1.46	6.41	7.07
7125	1.35	6.49	7.71
7150	1.25	6.56	8.43
7175	1.16	6.60	9.21
7200	1.08	6.62	10.10
7225	1.02	6.62	11.47
7250	1.05	6.61	12.19
7275	1.11	6.56	13.42
7300	1.17	6,51	14.89

Table II– Antenna performance for the 40 meter version is presented here. Gain varies by only 0.59 dB across the band and peaks on 7200 kHz, where it is just under 7 dB. Performance compared to the reference dipole at a height of 40 feet is less than the 80 meter counterpart, since the effective height of the dipole is doubled on 40 meters, thereby giving a more effective lower radiaton angle.

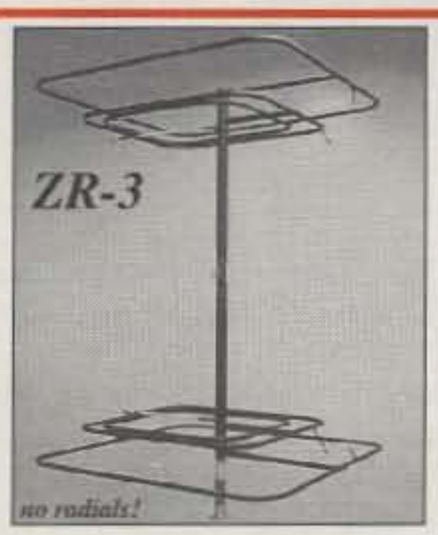
very heavy. Most who wrote wondered about applying one modification or another. All have been answered. Most were too specific to print here. Some reader comments have already been generalized at the beginning of this article. Still others justify discussion.

In general, it is correct to say that anything that changes the electrical length of any part of this antenna will greater mistune it to the point where it is no longer within the design or performance specifications. In other words, no, you cannot substitute your 60 foot tower tapped at the 35 foot level for one of the vertical elements, but yes, you may use a 35 foot tower for a vertical-leg substitution with, perhaps, minor tuning changes if you are prepared to find a new value of C.

Minor changes such as wire size do not impose a problem. Use hard drawn copper wire that will not stretch and result in detuning the antenna over time. If you have a problem with radials during the lawn cutting season, then use closed eye lugs to fasten the radials to a circular baseplate under each vertical section with #6 hardware. Detaching them during the months when these bands are dead is easy, and the radials will not get in the way. They can be reinstalled in the fall. It might also help to number them. A pair of oppositely directed radials simply isn't enough. Remember that half of this antenna consists of what is on the ground. What is in the air is the easy part of constructing any vertically polarized ground-plane style antenna. Do not cut back on the radials thinking that only one or two will do. Putting radials down *once* (maybe twice a year if you follow the suggestion above) is not difficult, only time consuming. The pain subsides quickly, but the rewards go on for a long time.

Just about anything may be used as a counterweight. I happen to have a quantity of lead ingots with a half inch hole in one end. Others have thought of using coffee cans filled with concrete and an eyebolt in each one. About 20 lbs. of weight are needed at each end for the 80 meter version.

As stated in the beginning of this article, this antenna is not effective on the 20 meter band and those higher in frequency. It's not that this antenna is so good. It's that the alternatives are so bad—on 160, 80, and even 40. It is a loser on 20 meters simply because the typical competition is a 3-element Yagi at 50 feet. It is 10 dB worse than the Yagi. Constructing one for 2 meters is a waste of time! But put one up for one of the low bands, and it's a DXbuster! ■



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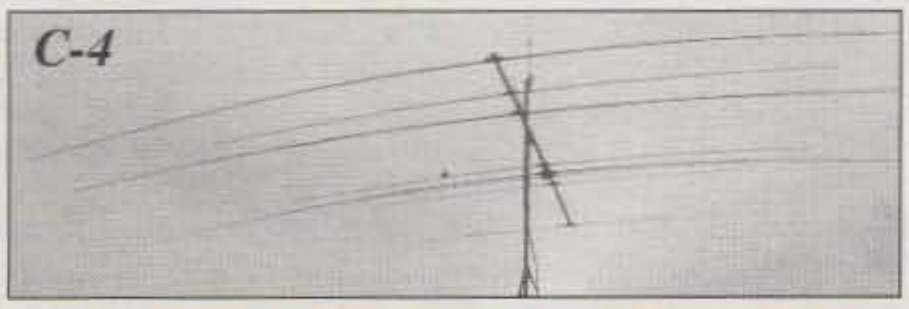

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The Kenwood TM-V7A 146/440 MHz FM Transceiver

BY DOUG DeMAW*, W1FB

I was astonished to note the small size of the TM-V7A FM transceiver when I took it from its box. It's difficult to comprehend so many features contained in a cabinet scarcely larger than a pocket-book edition of Webster's dictionary. Not only is it a two-band transceiver, but it puts out a maximum of 50 watts on 2 meters and 35 watts on 440 MHz.

I am especially impressed with the digital readout face which occupies approximately two thirds of the panel space (1" × 3¼"). Frequency and menu commands are clearly displayed in white on a blue LCD background. Various manually initiated commands are displayed in the readout window, too. I was pleased to observe how easy it is to read the displayed information when operating mobile, even during daylight hours. This is a vast improvement over the earlier black LCD numbers and letters on a gray background, particularly those with small display characters.

Another human-engineering advancement is the placement of the built-in speaker. The TM-V7A speaker grille is on the top cover of the box. This a significant improvement over the older rigs with their speakers pointing downward toward the floor from the bottom of the cabinet. The audio output is easy to understand despite the ambient noise that accompanies mobile operation. A large extruded heat sink at the rear of the cabinet ensures that the RF power transistors have adequate cooling. This is aided by a fan that is activated by a sensor when additional cooling is required. The fan operates quietly and is barely audible when it is engaged.

The Kenwood TM-V7A 146/440 MHz FM transceiver has a myriad of features in a small box.

More Features

The control head can be removed easily by pressing a latching lever at the top-rear of the panel module. Accessory cables are available (13 or 23 feet) for remoting the main assembly. This feature should appeal to amateurs who have vehicles with limited driver-compartment space. Another accessory is the VS-3 voice synthesizer. This is an essential option for visually impaired amateurs.

Memory channels galore are available in the TM-V7A unit. There are 280 memory channels (180 alpha numeric). The operator simultaneously can read frequency, seven-digit alphanumeric name, and the memory channel number. I found programming an easy matter compared to my experiences with some other transceivers. All manner of data—such as frequency offset, display settings, and DTSS codes—may be stored.

Visual scanning allows the user to observe the band activity (graphically) close to the selected operating frequency.

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Amateurs who are pilots may wish to obtain a TM-V7A that also receives from 118 to 135.995 MHz (AM). The AM mode is selected automatically when dialing up any frequency within the foregoing commercial range.

The back-lighted microphone has the touch-tone pad on the same side that the operator speaks into. This offers the advantage of not accidentally pressing the pads while gripping the microphone. It eliminates the need to turn the microphone over to access the pads. The rear of the microphone has a slide switch that locks all of the microphone keys other than the PTT and DTMF key pad (if equipped with same). UP/DOWN buttons are located at the top of the microphone. One press of either button moves the frequency up or down by one step. Holding down either button causes continuous frequency change until the button is released. The microphone can also be used to control ON/OFF, power changes, volume, etc.

The microphone attaches to the transceiver with a snap-in phone-style modular six-circuit plug. Removal is quick and easy when one wants to lock the microphone in the glove compartment for security reasons.

Receiver Features

The TM-V7A receiver is a double-conversion superheterodyne with IFs at 38.85 MHz and 450 kHz for 2 meter operation. The IFs are at 45.05 MHz and 455 kHz during 70 cm use. The 12 dB SINAD is 0.16 µV or less for excellent sensitivity. Squelch sensitivity is 0.1 µV or less.

The IF selectivity is 12 kHz at the –6 dB points on the response curve. It is 28 kHz or less at the –60 dB points on the curve. This ensures good channel separation during receive.

Audio output is rated at 2 watts (not measured by reviewer). Two jacks are available at the rear of the transceiver for attaching 8 ohm external speakers (models SP-50B or SP-41).

An LCD bar-graph S-meter is used with this transceiver. The visual scan mode graphically displays VFO or memory frequencies close to the operating frequency. Nearby active frequencies appear as vertical bars on the graph. The taller the bar, the greater the signal strength. A cursor at the bottom of the graph allows the user to move to any one of the displayed frequencies to monitor it. The center frequency on the display is the one chosen by the operator. The microphone UP/DOWN buttons or VFO tuning control may be used to move about in the visual scan graph. In essence, the system functions like a panoramic adapter. VFO or memory scan is also a feature of the TM-V7A. Scanning can be programmed to cover only a selected portion of either band (i.e., 1 MHz). In the default mode all of each band is scanned.

CTCSS (continuous tone-coded squelch system) uses a subaudible tone to control the

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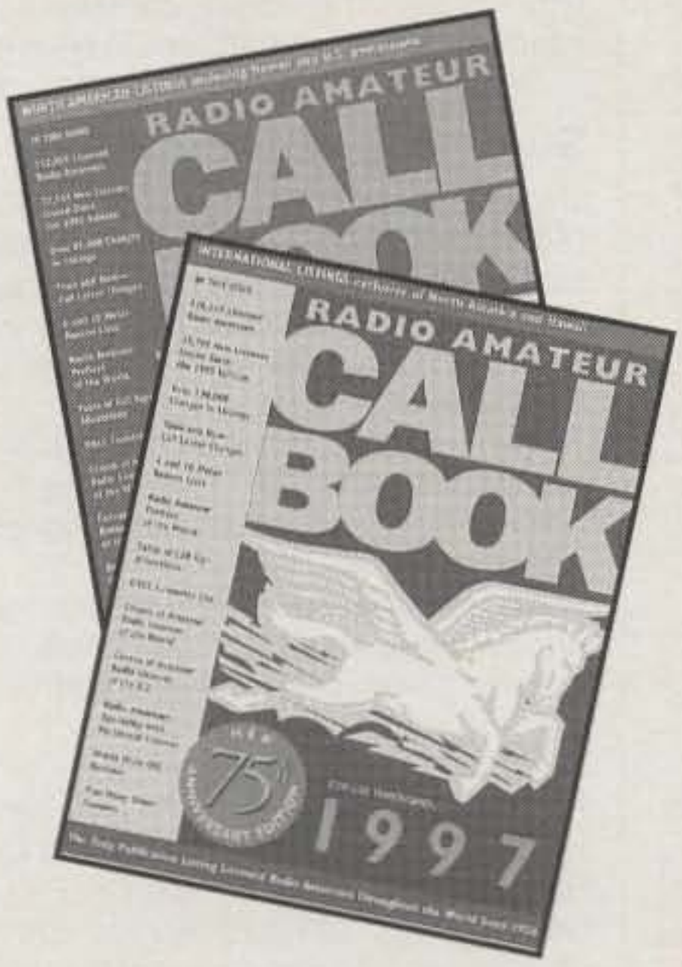

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squelch (the encoding and decoding functions are built in). This allows the receiver to ignore routine signals and respond to only those signals that contain the access tone chosen by the operators. This function can be carried further by utilizing the DTSS (dual tone squelch system). This involves using a three-digit multitone burst to open the squelch. There are up to 1000 three-digit codes available for this purpose. This function may be used for paging. The PAGE command allows the user to call one or several stations at one time, provided they use the same code. The caller can be identified by his code, which pops up on the LCD display. The additional options related to CTCSS, DTSS, and PAGE are numerous and too detailed to include in this review.

Transmitter Features

Three output power levels are available with the TM-V7A. They are selectable by toggling a front-panel pushbutton. The medium (M) and low (L) power designators are displayed on the readout face. Maximum power occurs when neither L nor M is displayed. On 2 meters the available levels are 5, 10, and 50 watts. During 70 cm operation they are 5, 10, and 35 watts.

Maximum deviation on transmit is less than plus/minus 5 kHz. Reactance modulation is used. Spurious emissions are listed as –60 dB or less (not measured by reviewer). Audio distortion at 60% modulation is specified as 3% or less. The microphone impedance is 600 ohms. An SO-239 antenna jack is located at the rear of the transceiver.

Due to the DC current required during mobile operation, it is necessary to connect the power cable directly to the terminals on the vehicle battery. The user is advised to avoid powering the transceiver from the cigarette lighter. The power cable supplied with the TM-V7A for standard mobile or fixed-station operation is 7 feet 3 inches long. The cable has a fuse in each conductor (two). The recommended current rating for an AC-operated power supply (at 50 watts) is 12 A. Substantially less current is required for 5 or 10 watt operation (three or four amps should suffice). Regulated operating voltages from +12 to +13.8 are suitable.

Although the TM-V7A is SWR protected, never transmit with the antenna shorted or disconnected! Damage could occur.

Other Functions

It is important to recognize that the TM-V7A is essentially a menu-driven transceiver, despite a wide range of manual commands that can be used. Modern amateur equipment embraces the menu-driven concept. It should be an easy matter for the owner to become familiar with programming the transceiver, especially if he or she has computer experience. The first instructions in the manual explain in simple steps how to access a local repeater without using the menu system. Many pages of programming information, with illustrated steps, are contained in the manual for those who want to utilize the menu system.

Needless to say, the TM-V7A accommodates packet operation. All the user need do is connect the transceiver to a PC and TNC, and then select a 1200 or 9600 baud rate, depending upon the TNC being used. An RS-232C cable and a 6-pin mini DIN plug (optional PG-5A) are needed for packet interface.

Auxiliary functions available with the transceiver are time-out timer (TOT), automatic power off (APO), automatic band change (A.B.C.), selective display blanking, and keypad direct entry. The owner may also take advantage of the programmable VFO feature, transceiver lock, squelch hang time, and advanced intercept point (AIP). The latter function disables the receiver preamplifier to increase the overall dynamic range. This is particularly useful when it is necessary to reduce intermod distortion products caused by strong local signals, especially in urban areas. In-depth explanations of these unique features, along with treatment of the standard ones, are provided in the operator's manual. The manual contains 93 pages of information that is presented in plain language.

Summary Comments

The transceiver is 2.15"H × 5.51"W × 8.09"D (54.5 × 140 × 205.5 mm). The unit weighs 2.6 lbs. (1.2 kg). The main cabinet (sans removable head) is 1 1/2 inches high. The front of the box and removable head are dark gray. The rest of the enclosure is black.

Two primary models are available. They are the TM-V7A (144/440 MHz) for use in the USA, and the TM-V7A (144/430 MHz model) for general use.

Accessories supplied with the transceiver are a microphone, DC power cable, 15 A fuse, mounting bracket and screws, instruction manual, and warranty card.

Software for programming the TM-VA channels and reading them back is available for use with WIN 96 and WIN NT (Applied Computing Systems, Inc., 120 Longview Dr., P.O. Box 936, Los Alamos, NM 87544 [505-672-4003]). I obtained an advanced copy of the program (EZ Clone) for testing with the TM-7A and found it to be excellent for the purpose. The package includes an RS-232 adapter cable for the TM-V7A, and sells for $40.

There is much more one could say about the TM-V7A, but page space is limited for detailing the many features and functions associated with state-of-the-art amateur equipment. I have attempted to highlight those features and procedures of primary interest to potential owners. More information is available on the world wide web <http://www.kenwood.net>.

The manufacturer is Kenwood Corp., P.O. Box 22745, Long Beach, CA 90801-5745 (310-639-5300). Typical price class is $570. ■

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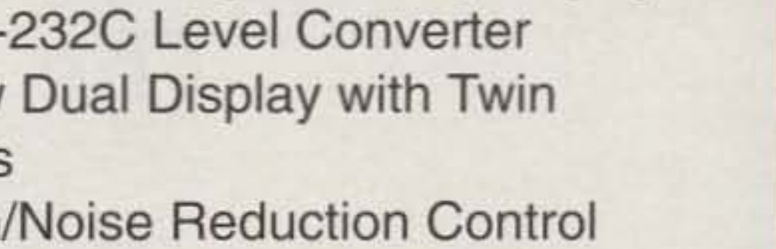

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The EJ7NET Story

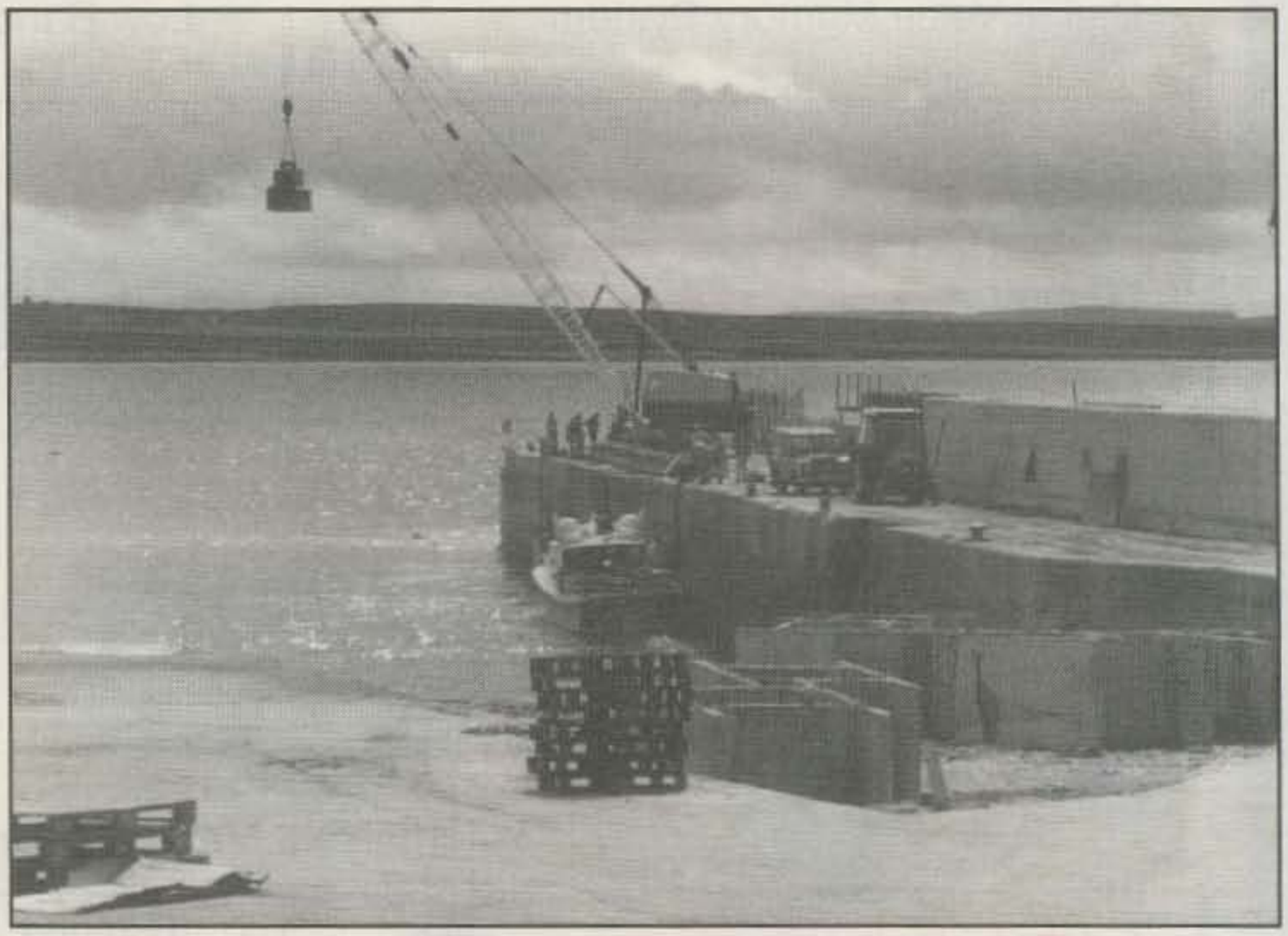
A Contest DXpedition To Inis Meain, The Aran Islands, EU-006

BY DECLAN CRAIG*, EI6FR

There is little like a shared adventure to bring people together. Having successfully completed our IOTA contest trip to St. Tudwals (see *CQ*, March 1995 issue), we were ready for a little more DXing IOTA style. On St. Tudwals it was agreed that we would look towards an EI island in 1995 and put in a very serious effort for the contest. Several possibilities presented themselves: the Saltee Islands on the south coast, the Great Blasket in the extreme southwest of the country, and the Aran Islands located in beautiful Galway Bay. Both the Saltee and Blasket Groups had been activated previously by several of the WestNet Group. Under the banner of the then Islandhoppers Group and using the callsigns EJØSI, EJ6FR, and EJ3HA, both EU-103 and EU-007 had been made available to the IOTA Deserving. Based on our previous experiences on these islands, we set about examining them as a potential contest site.

First it was agreed that the Blaskets would not be suitable. Access to the island is very much dependent on the weather. Even in midsummer it would be impossible to guarantee that we could land on the Great Blasket or indeed leave after the contest. Added to this was the difficulty of getting suitable equipment to this island. The trip to Blasket is by small open boat, so there are limitations on the amount of gear a team could take. The island itself is lacking in contesting-type sites, the available ones being at the foot of a steep hill, which would effectively screen a team from Stateside.

Next we looked at the Saltee islands. These islands off the Wexford coast were activated by us in 1992 (see *CQ*, February 1993 issue). They are an ideal IOTA contesting location with reasonable access throughout the summer, a high-elevation operating site, and good takeoff in all directions. They also have some rarity value in IOTA circles. However, after some consideration we decided that we would leave the Saltees for the future, as we knew that we would need to make a large number of QSOs with the United Kingdom to stand a good chance in the contest. The Saltee islands were just a little too close to G to provide the promise of 20m QSOs in the required numbers.



This is the pier at Inis Meain with our vessel, the Sea Sprinter, *alongside.*

The Aran Islands seemed to provide the ideal location for us. Located in Galway Bay in the extreme west of the country, they held the promise of good runs on 20 meters to the UK for those valuable 15 point QSOs. Also they held the EU-006 IOTA number, which would be a sought-after multiplier for many stations in the contest. The group had not operated from these islands previously, so with enthusiasm we began the search for a suitable contest site.

The Aran island group consists of three islands, all of which are home to small communities of farmers and fishermen. The largest of the three is Inis Mor. This island is about 30 minutes sailing time by ferry from the Galway coast and is the most developed. It is very popular with tourists during the summer months. Reached by boat from the County Clare coast, Inis Oir is the smallest of the three islands, but is also very popular and is visited by many vacationers. Inis Meain is located between the other two islands and is the least developed of the three. It can be reached by light aircraft, as it has a small airstrip, or by a small inter-island ferry that travels between the islands, after having first made your way to Inis Mor. After careful consideration Inis Meain seemed to offer the best potential as a contest location.

The Planning

An advance party—Declan, EI6FR, and Tony, EI3HA—visited the island in May and rented a

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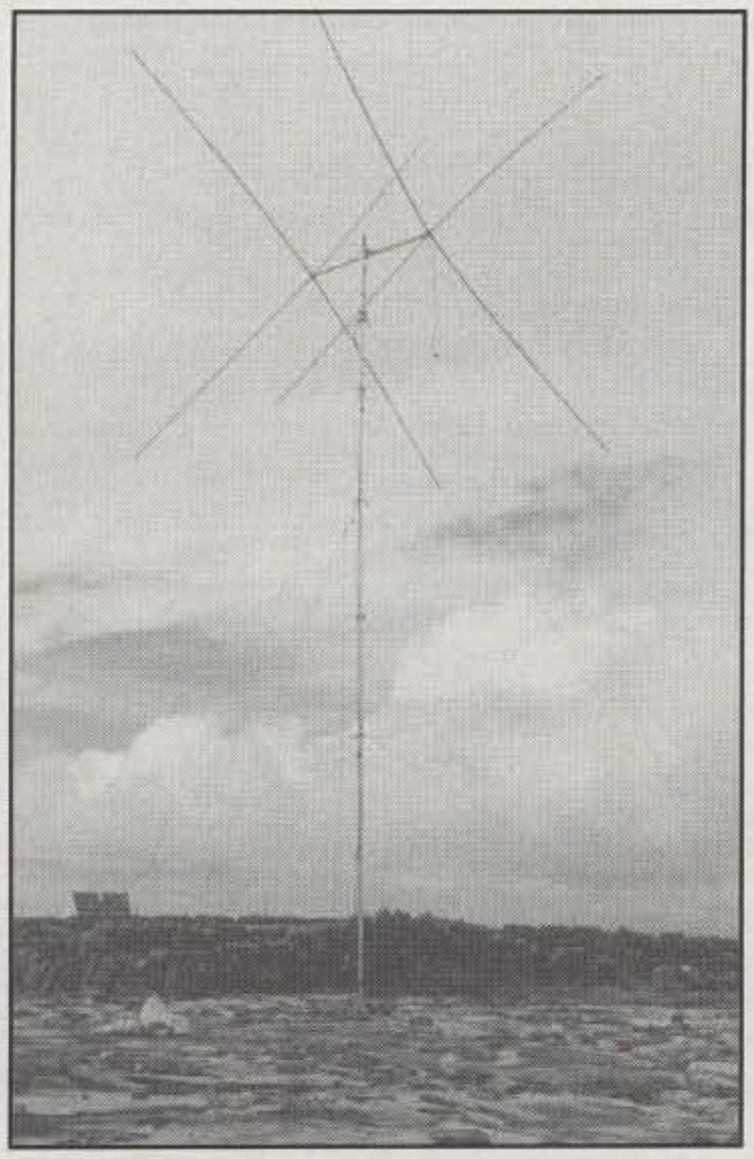

The terrain was rocky, so we had to use the masonry anchors to secure our guy wires. This view shows the Lightning Bolt quad.

house for the group to use in the following July's contest.The house could accommodate up to ten ops easily and had many of the comforts that on previous island trips our group had become accustomed to going without, such as showers and proper toilets. Also it had a large area of open ground which would allow plenty of space for antennas. However, on the down-side,the ground consisted of bare limestone and granite with practically no soil at all, although the rock itself had ample crevasses. Finding ways of anchoring the masts securely would present a challenge, but one we were certain could be overcome.

The site was about 150 feet above sea level and on an open plain at the northeast of the island with good takeoff in all directions. After having taken plenty of video-tape footage, Declan and Tony returned to Dublin to report to the crew and to begin the planning in earnest.

Most of the guys who had taken part in the St. Tudwals trip were eager to come along. Unfortunately, Pete, GI1ONL, was unable to make the trip this time. We signed up Andrew, GIØNWG, a hot CW op and contester and good friend of Robert, GIØKOW. Added to the GW contingent would be John, GW3JXN, while the EI's added Emmet, EI7HF, to their numbers. The final lineup then would be Declan, EI6FR; Liam, EI7DSB; Tony, EI2GX; Alan, EI9IF; Tony, EI3HA; and Emmet, EI7HF. From GI would come Robert, GIØKOW, with Andrew, GIØNWG. Joining us from Wales would be Tony, GW4VEQ; John, GWØONY; and Dr. John, GW3JXN.

The packet links from GI to EI to GW were kept busy over the next few weeks as we put together plans for a competitive station and began to put the transportation arrangements in place. We were very pleased to hear that the ferry company, Stena Sealink, had agreed to provide sponsorship in the form of free transportation of the GW team and their automobile from Wales to Ireland. Declan began the plan-

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The West Net DX Club DXpedition team posed for a group picture at the EJ7NET site.

ning of the trip to the island itself. The possibility of flying to the island was looked at but proved quite expensive, although we did consider perhaps sending rigs, computers, etc., by this route. However, in the end it was agreed that we would travel as a group using the normal ferry route. Also, we planned to travel on the Wednesday before the contest. Not only would this allow plenty of time for antenna work, but on this day we could travel directly to Inis Meain. On other days it would be necessary to travel firstly to Inis Mor and then unload and reload again onto the small inter island boat.

As we intended to make the EU-006 IOTA island readily available outside the contest, we planned for three stations and several antennas. We would have two masts available. The first would be a 35 foot portable mast designed and made by Alan, EI9IF. This would support the HF beam. David, GI4SNA, the importing agent for Lightning Bolt Quads, had kindly loaned us one of the 5-band quads for the trip. Also, this mast would carry some low dipoles for the 40/80 meter bands. Tony, GW4VEQ, had constructed a 70 foot mast. This would be raised on the island to support slopers for 80 meters, a Delta loop for 40 meters, and the 160 meter antenna. Also along for good measure would be a pair of Butternut HF6V antennas.

The primary station would consist of a Yaesu FT990 with a Tokyo Hy-Power Amp. The secondary station would be a Kenwood TS850 with an Ameritron AL84 amp. In the backup box would be a Kenwood TS140s, just in case. Also to be hauled along was a pair of PCs for logging and to be used if a link could be made to the packet cluster network. Some 2 meter radio gear and antennas were also to be transported for this purpose.

The list of equipment was compiled and "who brings what" lists were distributed. Among the extra items we had to plan for were a large hammer action drill and masonry bits, plus anchor bolts to allow us to get the masts up on the rock plateau that was to be our site.

Off We Go

On the morning of July 25th, Declan, EI6FR, met the GW contingent at the ferry terminal in Dun Laoire. The GWs had had a gentle passage across the Irish Sea from Holyhead and were looking forward to meeting the rest of the team. It was then onward to the rendezvous point, which was a McDonalds restaurant near the main Galway road. Here the team assembled and built up their DXpeditioning strength on the McD's Big Breakfasts.

The drive to Galway from Dublin takes about 2½ hours, during which the visitors had a chance to enjoy the scenery and good weather. Arriving in Galway, there was a chance for some lunch and the purchase of the inevitable last-minute items, including the anchor bolts for the low-band mast, which somehow had been overlooked. ("I thought you got them?!")

From Galway city it was another 50 minute drive through the rugged yet very beautiful Connemara countryside to the small fishing port of Rossaveal, from where we would embark for the island. It being the height of the tourist season, the ferry promised to be quite crowded. The captain commented on the "unexpected" amount of equipment we had, this despite our prior warnings during telephone conversations. However, after a brief review of the price, a "deal"' was struck, and before long the team and all the gear was aboard the *Island Discovery* and we put to sea.

The sea conditions were very good for the trip to the islands. The *Island Discovery* first made its way to Inis Oir, where it offloaded passengers and supplies before continuing the journey to Inis Meain. Arriving at the Inis Meain pier, we were pleased to see our host was waiting with a couple of four-wheel-drive vehicles to help transport our equipment to the site.

It had become a tradition with us to lose something over the side of the boat, and this occasion proved no different, as a bag burst and several pounds of bacon intended for DXpedition breakfasts disappeared over the side

to provide the fish with a tasty meal.

With most of the gear aboard the Landrovers, we picked up the mast poles and walked the half mile to the house. Arriving at our QTH, our DXpedition chef,Tony, EI3HA, set about getting his kitchen in order while the rest of us began to put together the station. We were lucky that the weather was good.

Setting Up and On The Air

The Butternut HF6V verticals were assembled and installed and the radial systems were laid out. These two antennas were placed about 300 feet apart, and during the weekend we were able to switch between them to avoid interference from the main antennas. Alan, EI9IF, worked with Liam to get the 35 foot mast ready for assembly, while Andrew, GIØNWG, and Robert, GIØKOW, put together the Lightning Bolt quad.The rest of the team got the slopers, delta, and dipoles together and ready for hoisting on the 70 foot mast which we planned to assemble the following day. The stations were assembled in separate rooms, and the switching was arranged to allow any antenna to be used at either operating position.

At last, as the sun began to set the quad was raised on the mast. We assembled in the shack and our new club callsign was aired for the first time: "CQ CQ CQ from Echo Japan Seven November Echo Tango, EJ7NET, on Inis Meain in the Aran Islands Group, IOTA EU-006."

During that first night many stations were worked on 17 meters SSB and on 30 meters CW. Later, satisfied with our first day of work, the team hit the hay, as there was still much to do before our station would be ready for the weekend contest.

The next day the island hardly seemed the same place at all. We had gone to bed on a cloudless night nursing the sunburn we picked up the day before. Now the Aran Islands weather was living up to its reputation as sheets of driving rain came in off the Atlantic. Still, there was nothing we could do but set to work and raise the large mast, as the low bands would be an important part of our contest effort. Tony, GW4VEQ, had pre-cut the hundreds of feet of rope to length. John, GWØONY, drilled into the rock and fixed the anchor points. The gin pole was set up in a downpour that would have frightened even Noah.

The mast was at last raised and fixed in position. The slopers were fixed at the 70 foot level—one for the USA and one for Europe. The Delta loop that had been prepared by John, GW3JXN, was fixed at the 60 foot level. Last, some very low dipoles were set up and tuned for the 80 and 40 meter bands. We hoped that these would allow big signals from high angles into G, which would give us valuable 15 point QSOs in the IOTA contest.

A last task to be completed in the rain was the setting up of the 2 meter Yagi to link us via a distant node in County Limerick to the PacketCluster network. With the work completed, at last we were glad for once not to be struggling along in tents, but to be able to retire to a warm house, hot showers, and a huge meal courtesy of Chef 3HA. With the station now ready to do battle, what better way to discuss tactics but over a pint or two of Guinness in the island's pub? This also gave us a chance to meet the locals and assure them that we were not as they feared—fishing quota inspectors or

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government revenuers—but rather just some crazy amateur radio operators.

We continued to provide QSOs with EU-006 for the IOTA Deserving on the WARC bands prior to the contest. We also tried briefly to get active on 160 meters, but some problems with the antenna resulting in a fried ATU kept us off top band. The rest of the time leading up to the contest was spent discussing tactics, band change times, and operating rosters, and ensuring that everyone was familiar with the contest software, in this case the excellent "Super-Duper" written by fellow EI Paul O'Kane, EI5DI. Paul had written a special version of his software for the IOTA contest and made it available as freeware.

At last it was time for the kickoff. We got off to a flying start on 20 meters SSB with Robert, GIØKOW on the microphone. The quad performed beautifully and the pileups were tremendous. During the next 24 hours all of the team would play their parts, each taking a turn at the microphone or key. During the contest we worked many familiar calls from previous IOTA operations and were very glad they took the time to call us. Old rivals in contesting were also heard and worked and QSO points were shared. As the final hours of the contest approached we knew we were doing well, and as we passed our score from the previous year on St Tudwals we cheered. At last it was all over, and the last QSO of the 1995 IOTA contest was in our log. As it would turn out, we were to earn third place world wide, more than we had hoped for and a great start for our new club call.

The contest was over, but the bands still held a surprise or two. Within the hour we were back on air as EJ7NET, and the pileups were bigger than ever. Surely nobody else still needed a QSO with EU-006. However, they kept coming. Alan, EI9IF, was on the microphone when we heard him ask, "Who's the JY?" Unbelievably, Alan, EI9IF, had been called by and was happily ragchewing with JY1. Alan was a new licensee, and his excitement alone when we explained that he'd been chatting with King Hussein almost made the whole trip worth it.

The sun reappeared in the afternoon, and Tony, EI3HA, was able to arrange his DXpedition barbeque. It was very pleasant sitting beneath the mast enjoying the sun, the beer, and the steaks and listening to "EJ7NET QRZ?"

You can see the intense look on our faces as we put the last one from Inis Meain in the log.

from the shack. That evening we continued to celebrate with a trip once again to the local pub, where we finished off the night beneath the stars with the finest Irish Whiskey while Dr John, GW3JXN, entertained us with some hair-raising medical stories and Emmet, EI7HF, our team philosopher took us on a search for the meaning of life, the universe, and everything. He lost most of us somewhere in sub-atomic particle theory, but it sure sounded good.

Time To Go

There had to be an end to our adventure, and on Monday morning we began to prepare for it. The antennas were taken down, the masts were lowered, and the stations were broken down and boxed for the trip home. We loaded the gear aboard a trailer supplied by the property owner, and pretty soon the tractor arrived to haul it to the pier and the waiting boat.

It's never over until it's over, as they say. The inter-island boat, the *Sea Sprinter,* arrived loaded with tourists enroute from Inis Oir to Inis Mor. Despite our having booked an exclusive trip, they had made a mistake and there was not enough room for both the tourists and us. By the time the *Sea Sprinter* was to return we would miss the connection from Inis Mor to the mainland. The *Sea Sprinter* made off for Inis Mor at top speed with a promise to return as quickly as possible.

Life is all about having the right connections. "It's not *what* you know, it's who you know." Out came Liam, EI7DSB's mobile phone. Liam, as it turns out, is related in marriage to one of the "important" Connemara families. A quick call and we were in contact with the captain and owner of the *Aran Seabird,* who agreed to "arrange something."

At last the *Sea Sprinter* arrived. We loaded the gear aboard, bid farewell to our hosts, and at last left the island of Inis Meain. We checked our watches and determined that the *Seabird* should have left Inis Mor 20 minutes earlier. We wondered if we would we be stranded there overnight.

Rounding the island we then saw her. The *Seabird,* packed with tourists, was "hove to" and awaiting us alongside. We had never imagined a sea transfer in the Atlantic, and thoughts of dropped rigs disappearing into the depths flashed through everyone's mind. However, there was no time to dwell on it. We were alongside, and we gingerly but carefully transferred the gear and team aboard to the clicking of cameras and the amused stares of the tourists taken aback at this unexpected entertainment.

We reached Rossaveal 30 minutes later, unloaded the *Seabird,* and packed the cars. A last look at the Aran Islands silhouetted against the setting sun and we began the drive east for Dublin. At Athlone we said goodbye to Robert and Andrew as they turned north for GI. It was then on to Dublin and the port of Dun Laoire, where we said farewell to our GW friends. For the EI's a short drive had them home, where the unpacking began. The Aran Islands adventure had come to an end. ■

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CIRCLE 154 ON READER SERVICE CARD

Most of us can see the humor and pathos in this antenna installation. It's also a good lesson for all of us to review basic safety precautions. We're not always this lucky.

It Was Big Enough
or
If an antenna falls in the city, will it black out the entire neighborhood?

BY TONY SMITHSON*, KN4TX

If you're an amateur radio operator, you've probably heard the adage, "If it stays up, it wasn't big enough." Well, my friend Charley Hood, KBØARN/HK3, built an antenna that *was* big enough (please note the operative word *was*). The following is my version of what transpired during that fateful project.

Charley was one of the first persons I spoke to when I moved to Bogota, Colombia. I moved from Trinidad, where I had enjoyed operating as 9Y4/KN4TX. I wanted to resume my HF operations as /HK3, and after some inquiries, I was given Charley's name as a contact in Bogota. Through him I was introduced to the Liga Colombiana de Radioaficionados (The Colombian version of the ARRL) and the Colombian Minister of Communications. Without Charley's assistance, I'm not sure I would have been able to operate legally in Colombia.

I telephoned Charley my first night in Colombia and since that time enjoyed many meals prepared by his wife, Becky, NØZEN. I also had the good fortune to operate from Charley's fine station. My dad, KD4CWT (now KS4SU), was my most frequent contact. Thanks to Charley, I was able to keep in touch with my family in Tuscaloosa, Alabama. This was a Godsend to me, because at the time my family consisted of my wife, my older son, and a son born just weeks before I arrived in Colombia. An agonizing situation was made tolerable, thanks to Charley.

Charley's antenna was a great home-brewed two-element, three-band quad built from an old set of faded plans he had found somewhere in Bogota. With that antenna and the 8000 ft. elevation of the capital city, he was a presence in South America, and most of the crew on 21.390's various nets knew of Charley. I often told people that Charley's antenna was so big and stood out so clearly in the sky over Bogota that airplanes landing at the El Dorado Airport used it as a landmark for their approach to the runway. When I visited Charley and arrived by taxi, I just pointed at the antenna and said, "Esta aca." ("There it is.") They immediately understood.

Sadly, things began to deteriorate at the Hood shack, and contacts stateside became more and more difficult. At times perfectly readable stations could not hear Charley (or me when I was operating from his QTH). We could hear locals working stateside contacts that we could not even hear. The had *never* happened before.

The problem was traced to the use of acid core solder in the construction of both the antenna and the coax connectors. **Lesson #1: Never use acid in amateur solder operations.** The combination of acid residue and the Bogota pollution produced a corrosive brew that destroyed both the coax and antenna feedline connections.

During the repair process, several mechanical problems with the antenna were discovered. The copper wire used for the elements was joined with brass wire clamps without solder. Each connection had cor-

Memories are made of this. The quad is finally up and ready for business. Even the scaffolding next to the tower is an impressive sight. All of this joy and happiness will change within a mere 24 hours.

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Say You Saw It In CQ

Coming down suddenly, the quad became a jumbled piece of scrap metal, while at the same time disrupting power to the entire neighborhood and cutting of the water supply to the house.

roded, resulting in poor electrical contact. **Lesson #2: Always solder the connection, especially when using dissimilar metals.**

One home-brewed gamma match had a sealed aluminum section with a piece of stripped RG-8 insulator and conductor extending from each end. Charley had used rubber caps on the ends of the gamma match, and since the rubber was not UV resistant, with time it cracked, allowing rain water to leak into the gamma match and thereby corroding the connections. **Lesson #3: Never use non-UV-resistant parts on an antenna or any parts exposed to the elements.** Enough lessons for now. Charley decided it was time to replace the whole shebang.

Charley became obsessed with building the ultimate quad for his location. He spent about a year gathering parts: spreaders, copper wire, remote switches, spiders, etc. He was trying to reconstruct (or maybe resurrect) an old Kirk quad that someone had put up years before in Bogota. The antenna had been taken down after limited use and stored in an old dairy barn. When Charley found out about that quad, he immediately bought it. However, the original three-band, four-element quad was not enough. He wanted to include the 12 and 17 meter bands as well. With a few calculations and modifications he began the construction of his four-element, five-bander.

Charley's home-brewed tower was 25 feet tall (with an additional 15 foot mast extended above) and mounted on his second-story roof. (The roof had a solid concrete platform to support an emergency water tank, and the tower was bolted next to the tank.) This setup put the boom of the antenna 60 feet above ground level. It made for an impressive sight, but was not very user friendly. It was difficult to work on the tower due to limited backyard space and its location on the roof. However, well guyed, the tower and antenna had survived quite a few thunder storms and an occasional earthquake. Recently, Bogota had been rocked by several very strong quakes in the 6.5 magnitude range.

The only way for Charley to get the antenna up on the tower was to erect scaffolding in the rear garden area and construct the antenna up on the scaffolding. The quad's 3 inch boom was 24 ft. long. Each element was 20 ft. by 20 ft. To get the antenna to the top of the tower he would have to use a gin pole to lift the antenna up, rotate it, and swing it into position. One of the primary guy wires made it impossible to erect the scaffolding, so the wire was moved and secured at a less than optimal angle.

In the midst of Charley's project a job transfer sent me back to the states, and I was left to imagine what it would be like to have that skyhook on my own roof. My little chimney-mounted two-element, five-band

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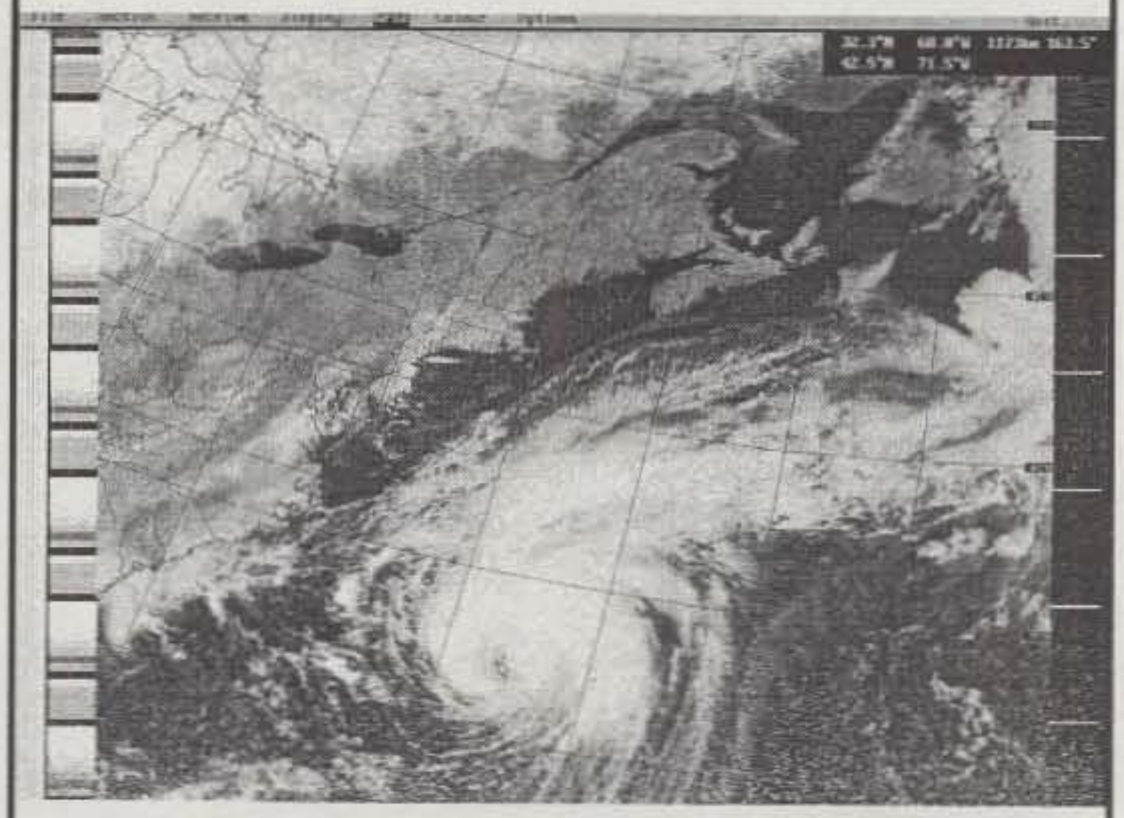

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Back to the drawing board. Here's what some of the metal looked like prior to the great rebuilding effort. It is mute testimony to the importance of safety and planning.

quad seemed depressingly inadequate. Had it not been for Charley, I probably would never have envisioned putting up a quad, but I had to see what it was like to have one of my own. I got my own station up and running, and I waited and waited to hear Charley on the air. I parked on 21.390, asking if anyone had heard Charley. Did he have his antenna up? How was the project going? The word came back that he had been delayed by a trip to the states and business concerns. Through the grapevine I did learn that Charley had most of the parts necessary to put up his dream.

Interestingly, I had another job change that included frequent trips to Bogota. I visited Charley in September 1994, and he was working on the hows and whens to complete the project. A subsequent trip in January found some interesting developments. Aren't all antenna projects supposed to be done in January? Of course, in Bogota it was sunny and the temperature was 75 degrees. Doesn't seem fair, does it?

Upon my arrival I found that Charley had erected the scaffolding. Since he had moved the guy wire, he lashed the tower to scaffolding for support. On the ground he had assembled two of the four elements—two down and two to go. A strong earthquake experienced in Colombia five days before my arrival hadn't dampened Charley's spirits about getting the quad up and on the air very soon. Here was my chance to at least lend a hand, so I postponed my return flight and showed up on a Saturday in my jeans ready to help. We put the finishing touches on the last two elements. The boom was already 40 feet above the ground, lashed to the scaffolding. I climbed up to the boom (yes, I had a safety harness), and two of the elements were passed to me using long bamboo poles and ropes. I attached the reflector and radiator to one side of the boom. They would be spaced out, and the two directors would be added once the boom was picked up and hanging above the scaffolding. That would come on a day without me, as it was late and I would be returning to the states before the work was completed.

I waited and waited to receive word of the projects and hear Charley beaming stateside. Nothing. Days stretched into weeks and still no word. My job change had meant moving to Houston, and I was reduced to listening on HF using a 75 meter dipole strung from my window. You think I felt inadequate with my chimney-mounted quad!

I heard nothing from Charley. I knew the sunspots were going down and the bands were fading, but even with my feeble antenna I should have been able to hear that antenna! I contacted my dad and asked him to try to get a report. The crowd on 21.390 should have known the scoop, as a couple of HK's are normally present in the afternoons. Then came the devastating news, relayed by Howard, HK3WOP, that the antenna went up, and like Newton's apple it had also come down.

In raising the antenna all had gone according to plan, and the combination of scaffolding, gin-pole, and helping amateurs had resulted in the placing of the antenna in the clouds. One passerby was so taken by the sight that while walking along the sidewalk in front of the house, looking back over his shoulder at the antenna, he walked smack into a power pole and fell to the ground.

Charley had not wanted to climb the tower himself, so he came up with an idea of how to get an experienced person up where the critical work was to be performed. Bogota is a city with many high-rise offices and apartments. Charley noticed one of the window washers who worked near his office scaling the nearby buildings with ease. He figured anyone who would hang from ropes and work on a little wooden platform high above ground level would have no problems climbing the tower and positioning the antenna. Charley asked him if he ever did any work "on the side." The window washer was more than happy to earn a little extra money. **Lesson #4: Get people who are experienced at working above the ground.** Once you get up on the tower, it's too late to discover you're afraid of heights. With firm hands, the window washer helped guide the antenna into position. The job was difficult but completed without incident.

The rented scaffolding had to be returned the same day the antenna went up, and it was night by the time all the scaffolding was taken down and put back where it belonged. Charley had planned to return the above-mentioned guy wire to its proper position when he returned. As long as the scaffolding was in place, it acted as a brace for the tower, so it was critical to return the guy wire to its proper place. It was so late when they got home from returning the scaffolding that Charley felt they should wait until morning. He would move the wire in the daylight rather than risk it in the dark.

Charley is a Southern Baptist Missionary, and the next morning he remembered he had a meeting with some of the local pastors. That called him away from an early appointment with the antenna, but he planned to return from the meeting, move the guy wire, climb back up, connect the cables at the remote switch box, and then get ON THE AIR!

The meeting had almost come to a close when Charley was called out to an emergency telephone call. Another amateur, Jim, HK3AVR, was calling. It seemed Aaron, KBØNOM, Charley's teenage son, was trying to reach him on 2 meters. By the tone of Aaron's voice, Jim knew something was dreadfully wrong. Aaron explained that there had been an accident with the antenna. Jim got the number where Charley was having his meeting and told him to call home immediately.

Charley didn't know why Jim, rather than his wife, had called. He called home and Becky said, "You need to get home. Now!" They had, in fact, tried to call him from home, but the phone was out. They could receive calls (as he had just proven), but they could not call out. This sounded bad! She also informed him that there was no electricity. Uh oh. This was *really* bad!

Charley rushed home. As he approached his house, the sky above looked empty—too empty. There was no antenna, no mast, no tower. He leaped from his truck and ran to the side of the house. He found a mangled pile of scrap metal and pieces of his quad draped over the 13,000 volt power line. Bits and pieces were strewn across the sidewalk. The once majestic tower was reduced to a gnarled finger pointing at the copper wires of the antenna draped across the power lines. Upon contact they had shorted out the electrical service, causing a power outage for several square blocks in the neighborhood.

A couple of pieces of equipment did survive. The Ameritron remote coax switch hit the power line and continued on to the ground. It took a licking and kept on ticking. Later we joked that maybe Charley could get some advertising money from them to help defray some of the loss. The Ringo Ranger perched atop the mast survived without a scratch. Charley is still amazed at how tough it was, never figuring out why it wasn't scattered along the roadway. It's back in use today.

When the quad hit the power lines, the current from the 13,000 volt line surged into the house. Charley's daughter Dawn was in the bathroom, taking a shower. According to her account, sparks and blue flames were coming from everywhere. Being ankle deep in water was no place to be, so she ran from the shower, grabbing a towel in her mad dash. She really is fortunate that the current from the power line didn't somehow find a conductive path into the tub.

The power company arrived within 20 minutes (that might be the most amazing part of this tale), and ordered them not to touch or move anything. The breakers on the power lines were controlled automatically by the central switching station and would continually attempt to reset. The power company would have to manually trip the breakers to shut off

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power. There was a real danger that they could be electrocuted without warning. **Lesson #5: Even if you think you understand the electrical service, NEVER touch the wires or anything connected to the wires; leave it to those trained to deal with the situation.** Word came that all was clear. Snip, snip, and the copper wires were removed. Within a few minutes power was restored to the neighborhood.

In the meantime, Aaron's call for help was heard by other local amateurs. Charley and I were both members of the Colombian English Speaking Amateur Radio Association, CESARA, which sponsors the English speaking emergency net. CESARA has a phone patch equipped 2 meter repeater on the mountain above Bogota. Three member amateurs (Jim, HK3AVR; Mark, HK3VJT; and Adrian, HJ3ZXC; plus Oscar, a prospective new amateur) showed up to help out. Jim and Adrian pulled out the video cameras to make a record for posterity. Too bad they hadn't been there about an hour earlier, as the $10,000 from Funniest Home Videos would have come in handy.

Jim was really worried about Charley, with all the money and man hours having gone up in smoke. Jim had been there from the beginning offering advice and encouragement. It was he who had discovered the acid solder problems mentioned earlier. What Jim initially found upon arrival really surprised him. Charley was smiling and laughing, taking it very well. When asked how he could be joking and laughing, Charley responded by saying it was either laugh or cry. He had just chosen to laugh about it. He did take it pretty hard, however, and later, when the full impact hit, he began to talk about giving it all up. It took a lot out of him, as we all knew.

With everyone helping it was time to assess the damages. The radio was not yet connected to the antenna, so it had been spared. That was the good news. Now the bad news. They had to rotate the antenna with the rotor to position it properly. The antenna rotor was plugged into the voltage regulator in Charley's office. Upon making contact with the power line, the 13,000 volts came in through the control cable into the voltage regulator. The main service ground had been cut during some electrical repair, and the workers had forgotten to reconnect it. That was why Dawn had seen all the sparks in the bathroom. With no common ground, the current had searched for a ground through every connection in the house. Thanks to the big power surge, gone were the television, the VCR, and the computer. Switches and sockets had been burned and damaged. Light fixtures had gone up in smoke. Everywhere they looked, things had been destroyed or badly damaged. Had the house not been stucco and brick, it may have burned as well. The water tank had been destroyed and had to be taken from the roof. With no shut-off valve, the Hoods were without water until the water line to the roof could be capped. Early damage estimates were in the thousands of dollars.

I have heard a few stories about lightning strikes and the strange damage they can cause. Although not as powerful, this "strike" did produce a few oddities. The most bizarre was the damage to the voltage regulator to which the rotor was connected. This voltage regulator had a screw-in fuse holder located in the front panel. The power surge had blown the holder out of its socket, shooting the fuse like a projectile across the room. It moved with sufficient velocity to hit the opposite wall, causing a small dent in the mortar, bounce back across the small office, and land on a shelf across the room. Thankfully, no one was in front of the voltage regulator when the antenna hit the power line.

I visited Bogota in March 1995, just a few weeks after the antenna had fallen. A few of the local amateurs gathered at Jim's house to talk. Charley was there and still able to laugh at the events that had transpired. He even had pictures for the group to see. We tried to figure out how it had happened and how it could have been avoided. One theory was that the earthquake had damaged the concrete platform on which the antenna rested, making it extremely unstable. While working with the broken water tank, the platform had tottered back and forth. Additionally, just before the antenna fell, a strong wind had come blasting out of the south (which rarely happens in Bogota), blown through the area, and surely contributed to the fall. Without the guy wire, the antenna had been at the mercy of the wind. With the guy wire, who knows? **Lesson #6: Murphy was an optimist.**

Charley gave me a lift to my hotel after our meeting, and the last thing I heard him talking about was rebuilding the rotator (which was of course gutted) and how his new tower was going to look. He was mumbling something about the tower not being tall enough unless you had to pack a lunch to work on your antenna . . .

When I returned to Bogota in April 1995 (which may have been my last visit), Charley was pulling out his plans for a self-supported 60 foot tower. He also had quotes for delivery of a commercial quad antenna, and I think I saw a lunch packed and sitting on the counter. ■

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	100FT/UP	500FT	1000FT
RG11A/U STRD BC (VP-66%) 95% BRAID NC/DB/UV JKT 1.3dB/1000WATTS	.42/FT	.40/FT	.38/FT
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18GA STRD 4/COND PVC JACKET	.20/FT	.18/FT	.16/FT
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50FT RG213/U MIL-SPEC DIRECT BURIAL JKT 1.5 dB @ 50MHz	25.00/EA
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The name conjures up a host of pleasant memories about equipment, and especially a company whose service policy was legend.

The R.L. Drake Company

BY JOE VERAS*, N4QB

A dozen years after its last amateur product left the assembly line, amateur radio remains a vital presence at the R.L. Drake Company. Just inside the entrance to the service department, a small museum displays many of the products the company made during its four decades in the amateur market. A little farther into the building, five technicians keep busy servicing amateur radio equipment.

Robert L. Drake's (W8CYE) first job after graduating from the University of Cincinnati was in the engineering department of the Dayton Radio Co. He also worked for Bendix and a company owned by Bill Lear before starting up R.L. Drake in 1943. The company initially had three employees, sharing a building with a coat-hanger manufacturer in Dayton, Ohio. Drake's first products supported the country's war effort and included high- and low-pass filters for the military and a device to jam enemy tank communications.

R.L. Drake survived the post-war recession doing contract work for larger companies, manufacturing everything from table lamps to small electrical parts. In 1948 the company entered the amateur market with a line of high- and low-pass filters, countermeasures against the emerging TVI problem. Now twelve employees strong, Drake moved to Miamisburg, Ohio in 1953. Accessories including Q-multipliers and phone patches were added to the product line.

During a period of convalesence from an illness, the product destined to propel his company into the big leagues began to take shape in Bob Drake's mind. The 1-A was not only R.L. Drake's first major product, but was also a trend-setter in the realm of amateur receivers. Up until that time, receivers apparently were valued by sheer size and weight. The 1-A, much smaller than top-of-the-line products from other manufacturers, featured a tall, narrow front-panel layout. Most revolutionary of all, it was designed primarily for single sideband.

The small museum displays many of the R.L. Drake amateur radio products and memorabilia. (All photos by Joe Veras, N4QB.)

Because he felt that his own company lacked the financial and manufacturing resources necessary for such a project, Bob Drake first offered his design to other companies, including National and Hallicrafters. When the larger firms showed little interest, Drake realized that if his design were to see the light of day, it would have to be under his own name. F.R. "Gibby" Gibb, W8IJ, the owner of Univeral Service (now Universal Radio) in Columbus, Ohio, encouraged Drake to build the 1-A, agreeing to take the first one hundred units produced. That encouragement, along with a growing interest from others in the amateur marketplace, put the R.L. Drake Company in the receiver business.

The first 1-A's rolled off the assembly line in late 1957. Early the next year, the company moved to larger quarters in Miamisburg. The 2-series receivers, the TR-3 transceiver, and the -4 and -7 lines of amateur equipment followed as the Drake family tree grew.

In 1977 the company began construction on phase one of a building to house its production facility in a Franklin, Ohio industrial park. A second phase of construction in 1984 made room for the engineering and service departments, creating a 92,500 square-foot complex that sprawls across a 20-acre site. Late 1996 saw the corporate offices join the other departments under that same roof. The

*P.O. Box 1041, Birmingham, AL 35201

Say You Saw It In CQ

R.L. Drake Service Manager Bill Frost, WD8DFP.

move made the "Miamisburg, Ohio" silk-screened on the front panel of Drake's radios an historical footnote rather than a statement of fact.

The service manager is Bill Frost, WD8DFP, a long-time Drake employee. Bill started with the company in 1966 after completing his military service. His first job was testing sub-assemblies on the T-4X production line. He wore several other hats for Drake before being appointed service manager, a position he has held for more than 20 years. Longevity is not uncommon at Drake. As we walked through the facility, Bill introduced me to several people whose length of service exceeded his own.

According to Frost, the only thing standing in the way of his department's servicing any Drake product is the failure of a no-longer-available part. Indeed, here and there in the service area I saw techs sticking scope probes into pieces equipment that had 20 or 25 years of hamshack duty behind them.

A short walk from where service department techs work on tube gear, a computerized assembly line puts tiny surface- mount devices on circuit boards faster than the eye can follow. Among the company's current offerings are equipment for the commercial and home satellite TV markets, and consumer-level shortwave broadcast receivers. A product of interest to amateurs and serious shortwave listeners is the R-8A communications receiver.

Following Bob Drake's death in 1975, his son, Peter W. Drake, assumed the leadership role in the company. The family still owns R.L. Drake, but none are involved in its day-to-day operation.

One thing not in evidence at Drake is a prototype of a new amateur transceiver. It is unlikely we shall see one in the future.

Prototype of the pass-band tuning unit that was used in the development of the first 1-A receiver.

For Drake, the nature of today's amateur marketplace does not support such an effort. Product life, in general, is too short to allow recovery of R&D and marketing costs, much less turn a profit on the actual production.

It was growing dark when I left Drake. In the fading light, I could just make out the tri-bander perched atop the tower that rises above the complex. As I swung N4QB/Mobile off Route 123 and merged with the southbound traffic on I-75, the antenna served as a reassuring reminder that although amateur gear no longer rolls off its production lines, amateur radio lives on within the company.

Readers who wish to contact Drake about service may write to them at 230 Industrial Drive, Franklin, OH 45005. The telephone number of the service department is 513-746-6990. The service manager, Bill Frost, may be reached via e-mail at <bill-frost@rldrake.com>. ■

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DSP Blaster™ 1.0 replaces hardware DSP boxes. It uses your PC and sound card to provide high- and low-pass SSB filters, CW/DATA/SSTV bandpass filters, CW peaking filters, adaptive noise reduction, automatic notch filtering, and AGC. *DSP Blaster* displays the signal waveform and spectrum to provide insight about the signals you're hearing. It's fascinating to correlate the sound of a voice with its spectrum. A system block diagram makes the program simple to use. Pass your mouse over a filter block to display its properties. Click to alter them or to activate the filter. *DSP Blaster* can run in the background. Mouse required.

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Many of you enjoyed the writings of Cass when he wrote the DX column for CQ from January 1976 through June 1989. He has always instilled the passion for the pursuit, the chase, the fervor, and the hunt, and most of all he has proven to a lot of us that DX really is.

DX IS!

WA6AUD and the West Coast DX Bulletin Revisited

BY PAUL M. DUNPHY*, VE1DX

Does this sound familiar? "One of the Local QRPers was by the other day, this one hippity-hopping up the hill with a gleam in his eye and the look of the young-and-knowing on his face. Son of a Gun! We had been looking forward to a leisurely fall afternoon of reflecting on the Great Days of DXing and the Mysteries of the Ages, but this was not to be. We had long ago learned to be wary of QRPers who think too much, and this one fit that category. . . . "

True-blue DXers who were around in the "early days" and those who have read about the history of DXing will recognize this as the writing style of Hugh Cassidy, WA6AUD, in a flash. Hugh Cassidy, or Cass as he is commonly called, was a DXing icon for many years, particularly between 1968 and 1979. WA6AUD was the editor and publisher of the "West Coast DX Bulletin" during this 11-year period.

Cass was first licensed in 1958 and was a DXer from day one. He pursued the hobby with a passion. His writing talent soon combined with his love of DX. Hugh held several positions with the ARRL, including SCM and Vice-Director. In 1968 he began publishing the "West Coast DX Bulletin" ("WCDXB"). This was a weekly newsletter dedicated solely to DX-related activities. There were similar publications during this period, as there are today. However, the "WCDXB" was the best! Absolutely. Ask any Old Timer and he'll tell you the same thing.

WA6AUD published the "WCDXB" for 11 years, every week, without missing one. He and his XYL, Virginia, did it alone! That's right, a two-person publishing team who used the cover "The Marin County DX Group." At its peak, the WCDXB had a circulation of 3200—2600 in the US, Canada, and Mexico, and 600 overseas. This was all done by hand by these two people! Their equipment in the shack consisted of a MULTILITH 1250 offset printing press, a big camera, and a processor for making the paper printing plates. During the 11-year run of the "WCDXB" The Marin County DX Group generated approximately 550 issues of the bulletin.

The reason for the success of the "WCDXB" was twofold. First, Hugh's primary devotion to the bulletin was accuracy and timeliness. He always verified his sources and would not publish anything that was more than two weeks old. WA6AUD's bulletin did not depend on rumor. Remember, during this time, when e-mail and the Internet were unheard of, two weeks was fast. The information had to be compiled, assembled into the bulletin's format using the technology of the day, and delivered to the Deserving DXer's door within this time frame.

The second reason why the "WCDXB" was so successful was the writing style. In my mind, this was the real reason it was a cut above the rest. Over the course of the bulletin's lifetime Hugh developed characters that he integrated into his DX reports, propagation forecasts, and most predominantly, into his editorials. To fully understand this, one has to have read the "WCDXB," or perhaps the book *DX IS! The Best of the West Coast DX Bulletin,* which was published in 1981 by W5DV and W6OGC.[1] DX enlightenment, and becoming one of the Anointed Ones, takes time. The road to DX understanding is not always a smooth one, as many true-blue DXers have come to understand.

Hugh Cassidy, WA6AUD, will be 80 years old this June. Hugh was editor and publisher of the "West Coast DX Bulletin" from 1968 to 1979, and author of CQ's DX column from January 1976 through June 1989. He gives true meaning to his phrase "DX IS!" (Photo by NI6T)

The writing style that Hugh Cassidy used in the "WCDXB" has influenced the art of DXing over the past 25 to 30 years in a way that is hard to describe. We often hear of up-and-coming DXers using phrases and sayings that originated from the writings of WA6AUD. Terms such as "The Great Days of DXing," "Only The Deserving," "Be a Believer," and of course "DX IS!" all came from the wit and wisdom of Hugh Cassidy

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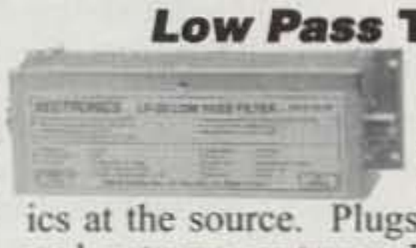

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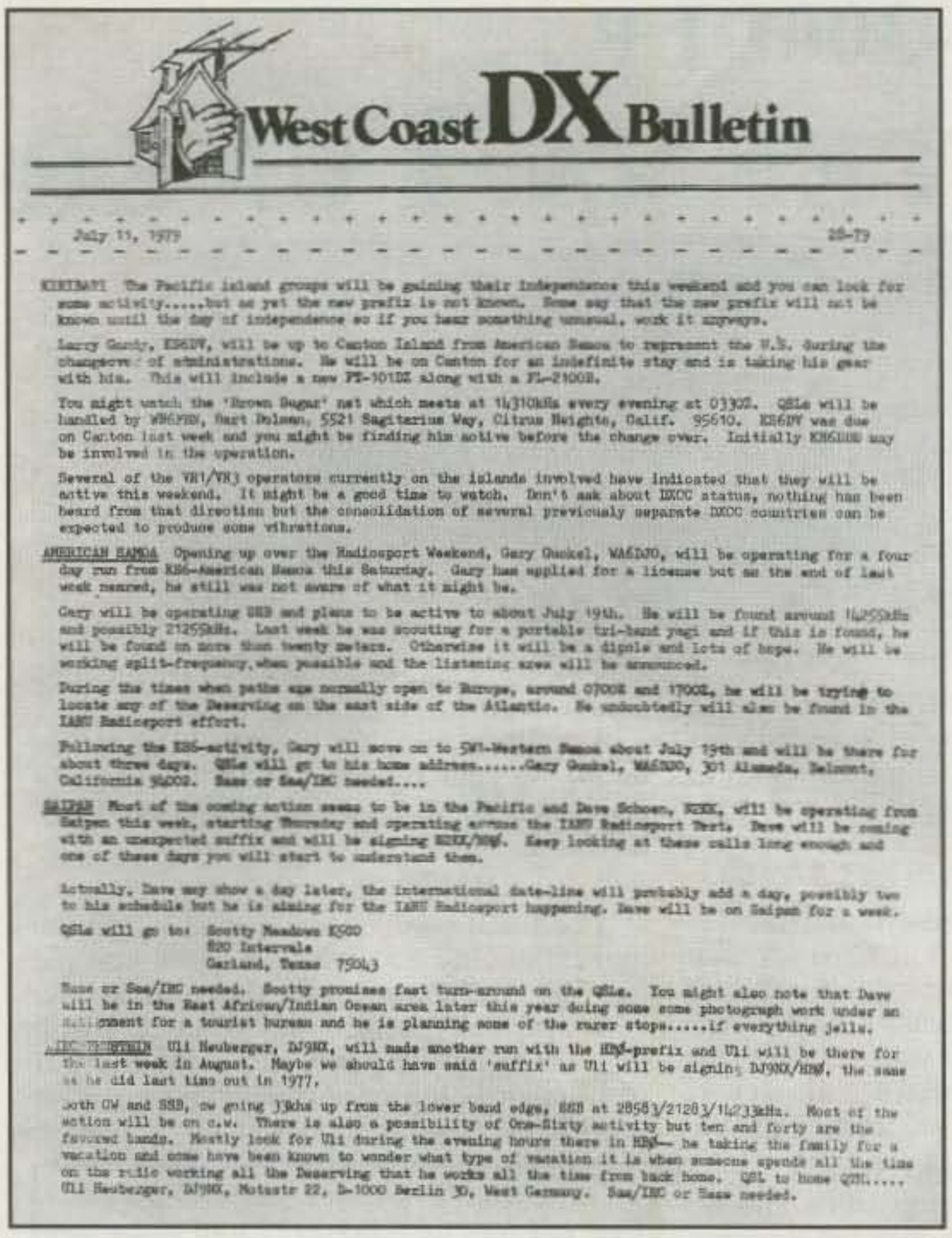

West Coast DX Bulletin

July 11, 1979 28-79

KIRIBATI The Pacific island groups will be gaining their independence this weekend and you can look for some activity.....but as yet the new prefix is not known. Some say that the new prefix will not be known until the day of independence so if you hear something unusual, work it anyways.

Larry Gundy, KS6DV, will be up to Canton Island from American Samoa to represent the U.S. during the changeover of administrations. He will be on Canton for an indefinite stay and is taking his gear with him. This will include a new FT-101DX along with a FL-2100B.

You might watch the 'Brown Sugar' net which meets at 14,310kHz every evening at 0330Z. QSLs will be handled by WB6YBH, Bart Bulman, 5521 Sagitarius Way, Citrus Heights, Calif. 95610. KS6DV was due on Canton last week and you might be finding him active before the change over. Initially KH6HHB may be involved in the operation.

Several of the VR1/VR3 operators currently on the islands involved have indicated that they will be active this weekend. It might be a good time to watch. Don't ask about DXCC status, nothing has been heard from that direction but the consolidation of several previously separate DXCC countries can be expected to produce some vibrations.

AMERICAN SAMOA Opening up over the Radiosport Weekend, Gary Gunkel, WA6DJO, will be operating for a four day run from KS6-American Samoa this Saturday. Gary has applied for a license but as the end of last week neared, he still was not aware of what it might be.

Gary will be operating SSB and plans to be active to about July 19th. He will be found around 14,255kHz and possibly 21,255kHz. Last week he was scouting for a portable tri-band yagi and if this is found, he will be found on more than twenty meters. Otherwise it will be a dipole and lots of hope. He will be working split-frequency, when possible and the listening area will be announced.

During the times when paths are normally open to Europe, around 0700Z and 1700Z, he will be trying to locate any of the Deserving on the east side of the Atlantic. He undoubtedly will also be found in the IARU Radiosport effort.

Following the KS6-activity, Gary will move on to 5W1-Western Samoa about July 19th and will be there for about three days. QSLs will go to his home address.....Gary Gunkel, WA6DJO, 301 Alameda, Belmont, California 94002. Base or Sea/IRC needed....

SAIPAN Most of the coming action seems to be in the Pacific and Dave Schoen, N2KK, will be operating from Saipan this week, starting Thursday and operating across the IARU Radiosport there. Dave will be coming with an unexpected suffix and will be signing KH2K/KH9. Keep looking at these calls long enough and one of these days you will start to understand them.

Actually, Dave may show a day later, the international date-line will probably add a day, possibly two to his schedule but he is aiming for the IARU Radiosport happening. Dave will be on Saipan for a week.

QSLs will go to: Scotty Meadows K5GO
820 Intervals
Garland, Texas 75043

Base or Sea/IRC needed. Scotty promises fast turn-around on the QSLs. You might also note that Dave will be in the East African/Indian Ocean area later this year doing some some photograph work under an assignment for a tourist bureau and he is planning some of the rarer stops.....if everything jells.

[illegible] Uli Neuberger, DJ9HX, will made another run with the HB9-prefix and Uli will be there for the last week in August. Maybe we should have said 'suffix' as Uli will be signing DJ9HX/HB9, the same as he did last time out in 1977.

Both CW and SSB, ow going 13kHz up from the lower band edge, SSB at 28583/21283/14233kHz. Most of the action will be on c.w. There is also a possibility of One-Sixty activity but ten and forty are the favored bands. Mostly look for Uli during the evening hours there in HB9— he taking the family for a vacation and some have been known to wonder what type of vacation it is when someone spends all the time on the radio working all the Deserving that he works all the time from back home. QSL to home QTH..... Uli Neuberger, DJ9HX, Motzstr 22, D-1000 Berlin 30, West Germany. Sae/IRC or Sase needed.

Many of the phrases contained in the writings of WA6AUD in the "West Coast DX Bulletin" have become part of the DX experience, jargon exchanged by true-blue DXers in their quest for just one more new one!

and the "WCDXB." We still hear these phrases today being used by seasoned DXers and newcomers alike, some perhaps not even aware of their origin. Nonetheless, they have become part of the DX experience, jargon exchanged by true-blue DXers in their quest for just one more new one!

In the limelight were the "Local QRPers." They were not QRP operators in the true sense. In fact, many of them had respectable linears and a few even had monobanders to go with the extra power. They were deemed to be DXers with country totals somewhere between 100 and 150. They had enough experience to ask the right questions, never really understanding the answers. The Locals had the interest, energy, and motivation. They wanted to know everything about DXing, and they were the ones who were always seeking the true meaning of "DX IS," trying to understand the "Mysteries of the Ages," the "Inevitable Truths," and the "Eternal Enigmas of DXing." The Old Timer knew everything about DX and DXing. He had worked everything and had grown up with amateur radio. It was rumoured he was there when the first post-WWII DXCC QSO was made in 1945. He never tired of DXing and was always ready for the next new one. The Old Timer had all the answers, but it was difficult to get him to share them with the QRPers. The Old Timer was both patient and impatient at the same time, realizing that in many cases if you had to ask the question, you wouldn't understand the answer!

Sunspot Louie watched the solar flux and the Ap index. His cousin, Red-Eyed Louie, was forever spending long days and nights tuning the bands. He always knew where the DX was, when it was on, etc. His legendary red eyes came from scanning the dials looking for DX to report, and more recently, from watching packet cluster screens. There was the "Legion of Handwringers," the malcontents who were forever finding something to worry and complain about. The Hero of Mafeking, a relative of Baden Powell, was always around prior to DXpeditions warning the Deserving DXers to "Be prepared!" When all else failed, Hugh called on Albert, who put things in perspective with the "Special Theory of Relativity." As Albert so well put it, from a DXer's standpoint: "All things are relative, and some more so." Who could argue with this?

The Palos Verdes Sundancers were the ones who brought on the solar cycles. They first appeared near the bottom of Cycle 20, when *QST* was reporting the possibility of another Maunder Minimum. There is historical evidence that there was a time some hundreds of years ago when there were no sunspots for a period of about 70 years. This fact was discovered by someone named Maunder, hence the name. In order to prevent such a dire reoccurrence, the Palos Verdes Sundancers got out their grass skirts and the big bass bongo, "Big DX," and danced up the sunspots every 11 years or so. The problem with the Sundancers was that after they got the flux up, they lost interest and stopped dancing! This plunged us into another cycle minimum, and they had to be cajoled into doing it all over again.

In 1979 Hugh Cassidy decided to terminate the "WCDXB." In his own words, this was the rationale: "In simple truth, the bulletin was taking all our time every day of the week. There were times when I would work until two or three in the morning on the bulletin and then go right back to work when we arose in the morning. I was the only editor. I ran its course and knocked it on the head when I got to the point where I had to end it. If some say they are the successor, it is not quite true. One group wanted to buy the mailing list; I sold that. I never did sell the bulletin."

In 1980, due to his literary contributions to DXing and his contributions to amateur radio in general, WA6AUD was elected to the *CQ* magazine DX Hall of Fame.

As an example of WA6AUD's writings, here is an editorial on net operations which he published in the "WCDXB." The mystique is typical of Hugh's talent. Was he for or against lists? A good question. Here's how he handled it:

One of the Local QRPers was up the hill last week, this one deep in his own troubles. "It is my DXCC total," the QRPer explained, "I have hardly moved for months." We were properly sympathetic, for well we know the chasm that awaits for the unwary DXer at the 300 country mark. "Oh, no," the QRPer interrupted. "I have a long way to go to the 300 mark. I am stuck on 127." Son of a Gun! We had to hear more on this one. How could a true-blue DXer get stuck at such a low total?

"Well," the QRPer said, "you know how it goes. I listen for all the lists and am always right in there to work the DX. I also check with all the daily DX nets and the other gathering spots, and I fear I have cleaned out all the DX there. I have looked around for other chances and picked up what I could. But after cleaning out all the nets and working all the lists, all I do now is listen. Maybe I've worked everything available."

Something was not adding up and we had to ask more questions.

"What about the DX that Red Eyed Louie is reporting?" we asked. "You haven't worked any of that, have you?"

The QRPer was silent for a bit. Finally he spoke. "Look," he said. "I do real good on lists and nets. But how do you work DX that is just out there in the open and not on a list? I have never worked one of those."

This was hard to believe, but these were unusual times. We thought for awhile and finally we figured we had an answer.

"Just pretend you are calling someone taking a list," we advised, and it was a real joy to see the QRPer's face.

"I will, I will," he cried and raced off down the hill. And we had to think of the day that is coming when someone will make Honor Roll without ever going outside a list. We have even heard that there is a move afoot, and the ARRL may surprise us with it, to have a "List DXCC Award." Think of the excitement this will bring when word gets out on Straight Key Night!

Hugh Cassidy remains active today. Although he no longer produces the "WCDXB" or writes for *QST* or *CQ*, he still writes the occasional article for the Northern California DX Club's newsletter, "The DXer." He will be 80 years young on his next birthday and is keeping up with the times. When I last spoke to him, he was assembling PCs for himself and his grandson—state-of-the-art computers with modems, sound cards, etc. A true amateur and DXer! Technology has changed, and WA6AUD has followed it.

We miss the "WCDXB," Hugh, but your legacy lives on in the minds of the Deserving true-blue DXers, who, for the most part, have come to understand the true meaning of "DX IS!" You made us laugh at ourselves. You made us think about DXers and DXing! You showed us our strengths and weaknesses, and most of all, you made us better DXers.

Footnotes

1. For those with Internet access, the Web Site at URL—<http://www.geocities.com/CapeCanaveral/1641/>—has a number of Hugh Cassidy's articles as well as stories written in his style by the author of this article. This Web Site is maintained by Mike D'Alto, K2CD.

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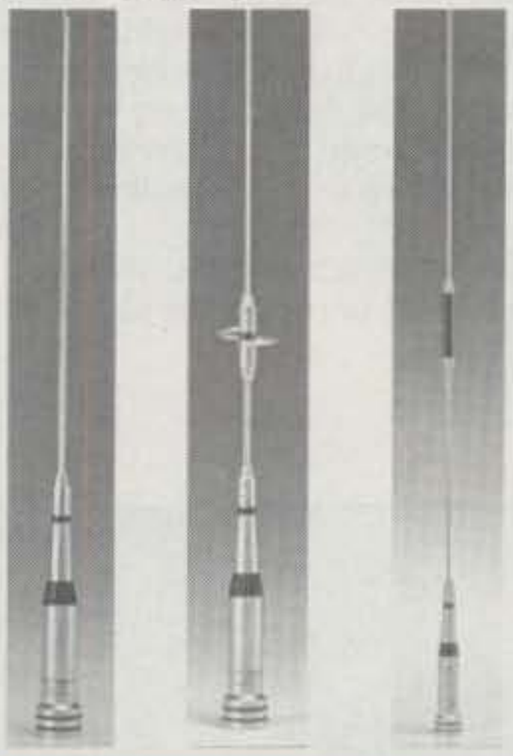

HP2070: VHF 1/4 wave/UHF 3/4 wave 0 dBd VHF/ 3.8 dBd UHF, GOLD/TEFLON UHF conn., 18.5 inch. long

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T For Two

A Simple, Easy-To-Build 2 Meter Mobile Antenna

BY THOMAS M. HART*, AD1B

In the hopes of making low-profile 2 meter contacts from my car, I did quite a bit of reading (and daydreaming) about various antenna designs. My goal was a system that would be suitable for use in repeater monitoring, but still would allow access to the stronger local machines. Living in the Boston area, I have easy contact with a variety of repeaters, and a simple antenna serves my needs.

My thoughts slowly coalesced around an antenna form that is usually seen on the lower bands, especially 160 and 80 meters. I settled on a top-loaded vertical T-antenna. Further, in the interests of keeping this a "stealth antenna," I installed the finished T for Two against the side of my station wagon window.

The top-loaded antenna was patented by Simon Eisenstein of Kiev, Russia in 1909. Refer to the book *Antennas and Techniques for Low Band DXing* by John Devoldere, ON4UN, from the ARRL (1994) for additional information.

One popular variant of the top-loaded antenna is the T-antenna, which is often found on the top bands, where it is used as a current-fed, top-loaded short vertical. The T-antenna exhibits very little radiation from the horizontal elements. Unlike the inverted-L antenna, which does show horizontal radiation, the symmetrical design of the T-antenna tends to cancel most of it. According to the *ARRL Antenna Book* (1974), top loading increases the radiation resistance of grounded verticals. Practical antennas use vertical elements as long as one-half wavelength. Where long verticals are impossible, the T-load forces the current loop to the top of the antenna, keeping the largest possible current along the vertical section. The accompanying illustration shows a common T-antenna, where the length from feed point to the tip of the T section is 1/4 wavelength.

Other versions of top-loaded verticals are capacitance hat antennas, coil and capacitance hat antennas, and T-wire and coil antennas.

*54 Hermaine Avenue, Dedham, MA 02026

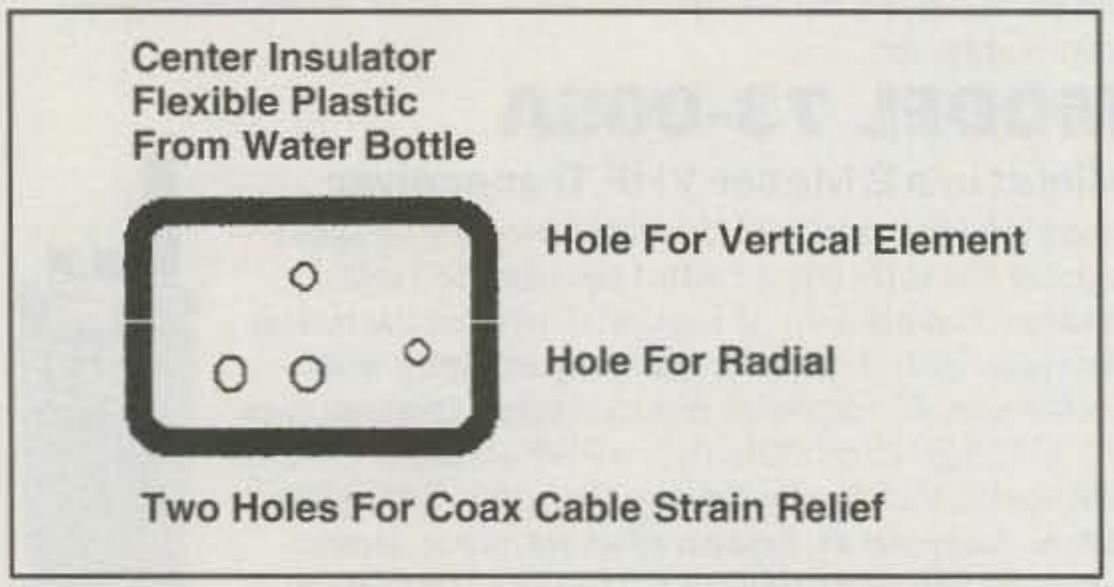


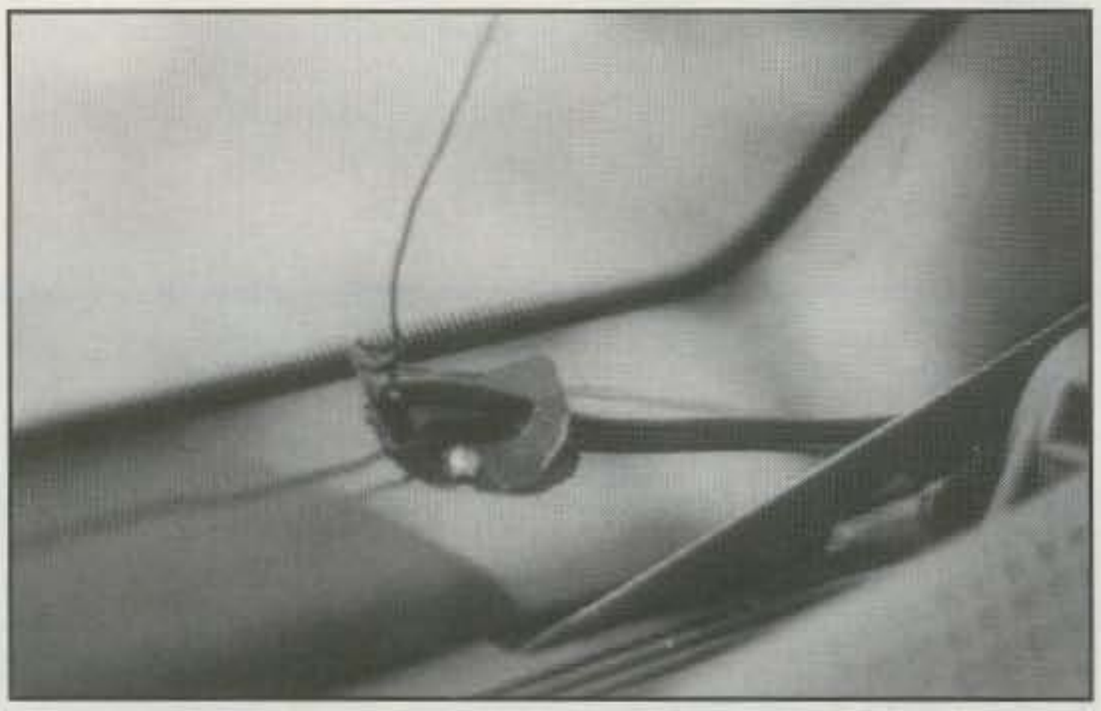
Fig. 1– The layout for the center insulator, which is made from any flexible plastic, such as that of a water or soda bottle.

A practical T-antenna for the 80 meter band is described by ON4UN as having a vertical section of 39.4 feet (60% of 1/4 wavelength). Converted to 2 meters, the vertical section becomes 11.4 inches (0.6 times 19 inches). The top element size was determined by cutting and pruning (refer to the illustration for the size and configuration of my finished antenna).

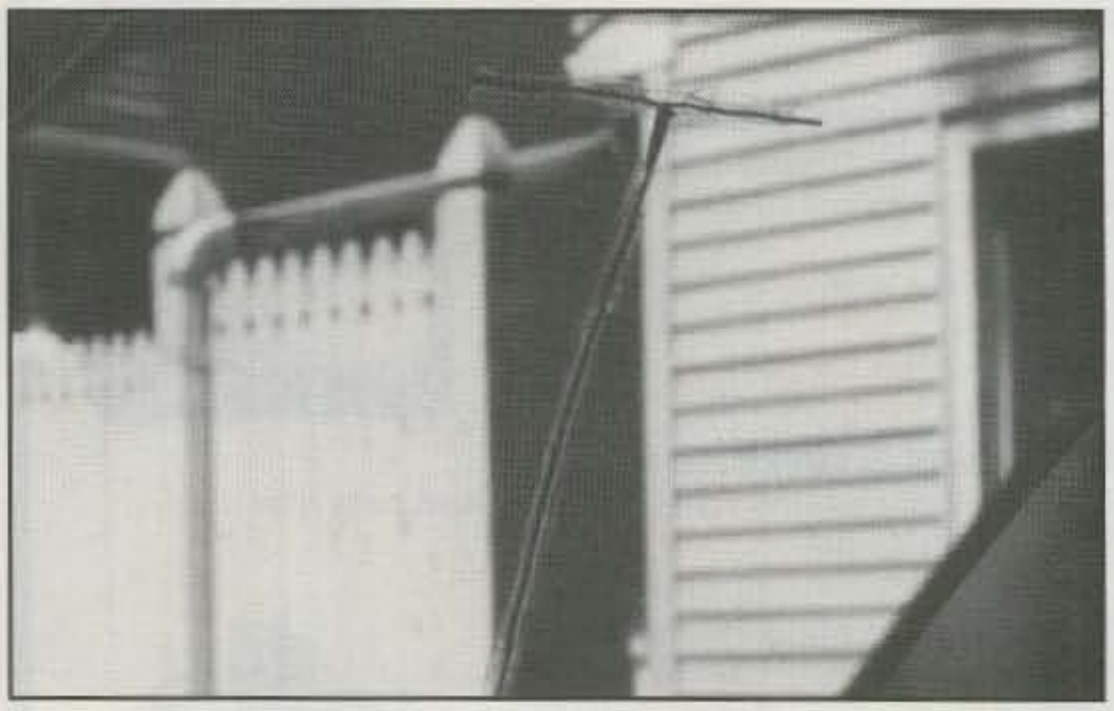
The steps in building a T for Two are as follows:

1. Prepare a center insulator from suitable material. I used a piece of plastic cut from a water container. Holes cut with a paper punch allow the passage of the wires; when done, I used a sheet metal screw to attach the insulator to the plastic molding next to the car window.

2. Build a 1/4-wave dipole for 2 meters and cut the elements careful-



Here is a view of the center insulator, which is made from readily available plastic.



The antenna itself is simply attached to the rear car window with clear Scotch® tape.

Say You Saw It In CQ

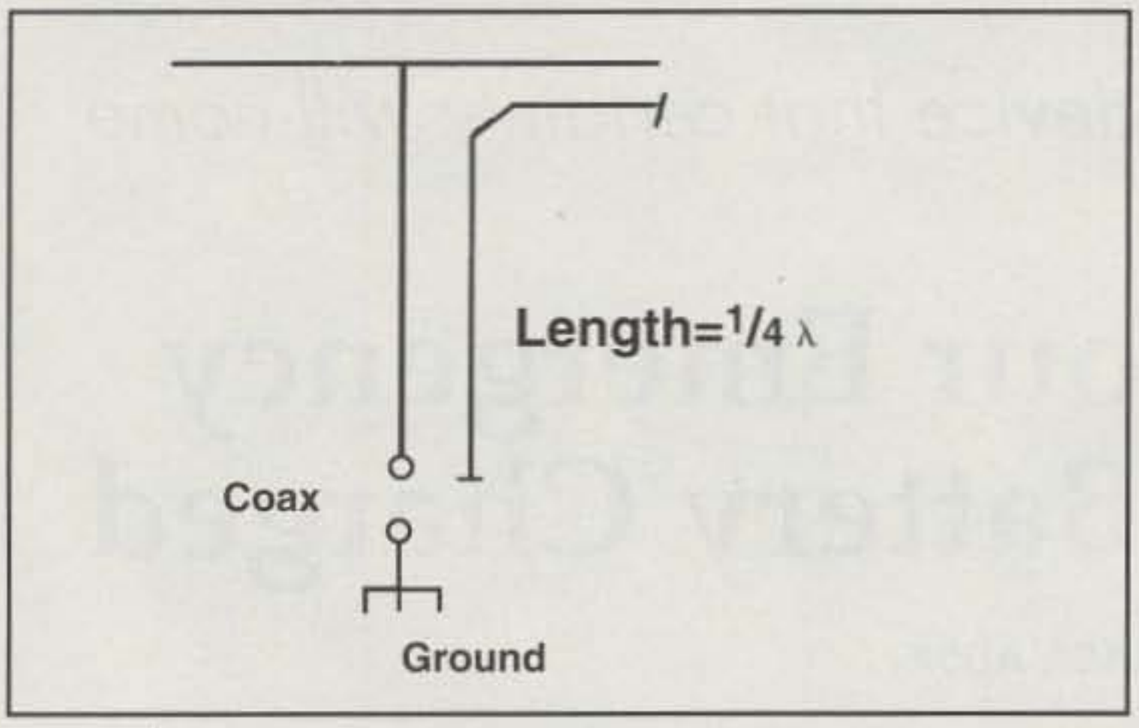


Fig. 2– A standard quarter-wave T-antenna.

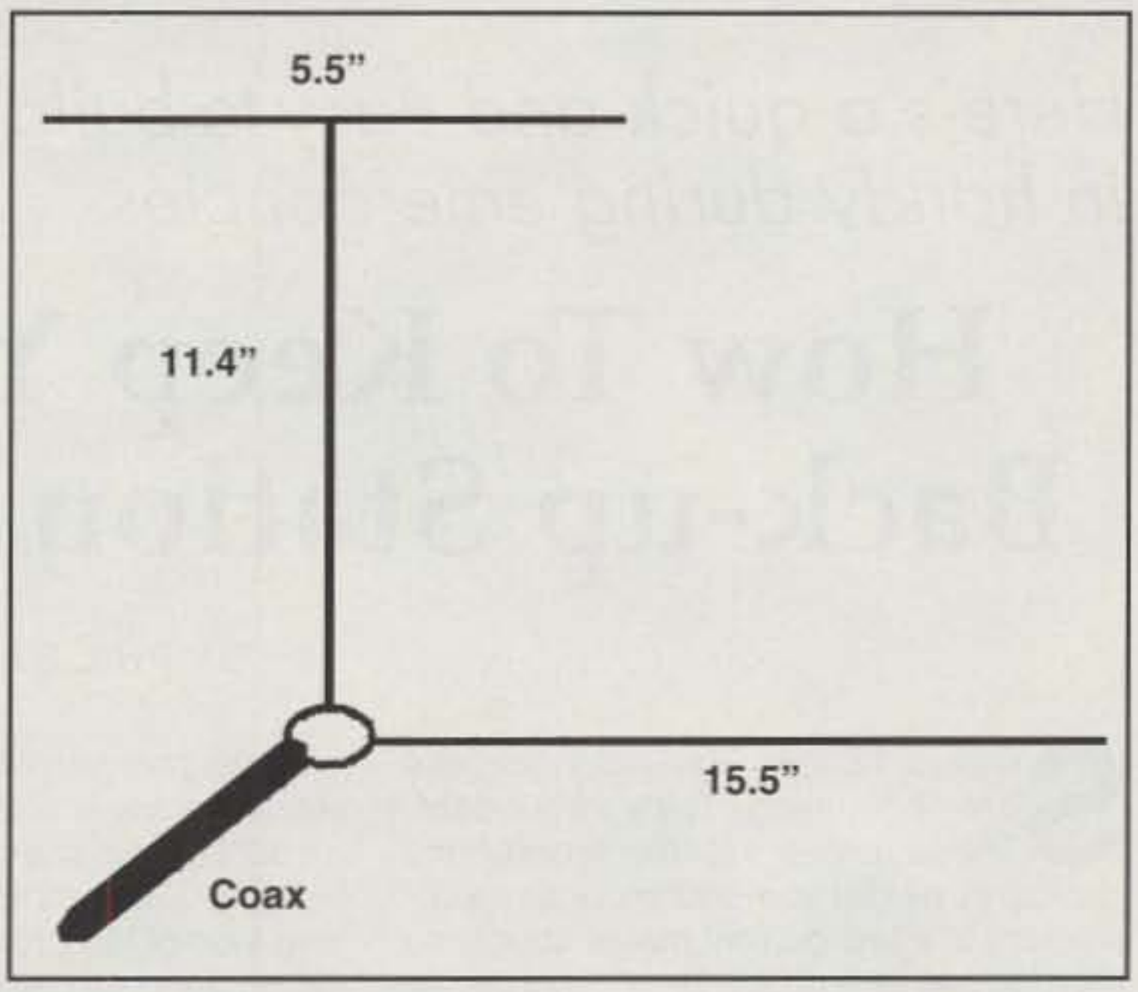


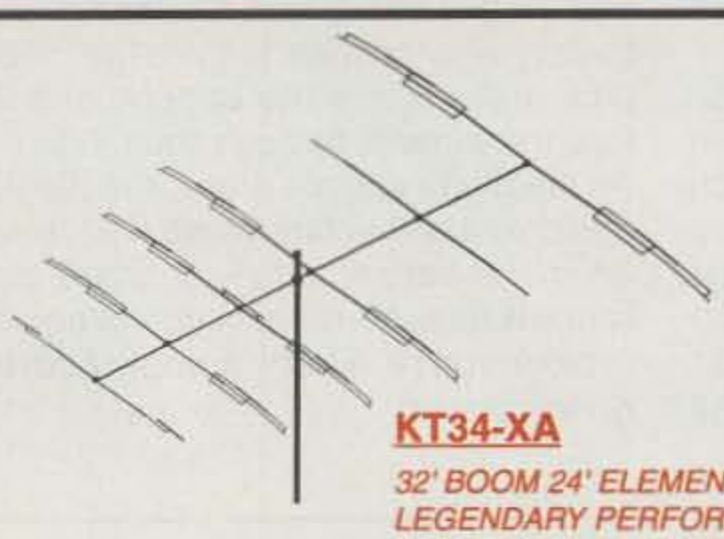
Fig. 3– Dimensions for the T for Two antenna. (See text for details.)

ly to achieve proper loading using an SWR meter. To start, element lengths of 20–21 inches are sufficient. I taped the unit to a window in the house to provide a suitable support for the tune-up process.

3. After the dipole is pruned, cut back the element attached to the coax center tap to 11.5 inches (this is the T-antenna vertical section). Attach a 7 inch top section to the vertical element and trim this to a final match using the existing radial as a counterpoise.

4. Use clear tape to attach the antenna to the vehicle glass. Check the SWR and prune the radial (not the T) to achieve a final match. Instead of cutting the radial, you may simply fold it back on itself until the SWR is correct. The size of the final antenna is smaller than I originally expected, probably due to the capacitance effect of the vehicle. Secure the radial with tape or a pin.

At this point, you should have a working 2 meter antenna that will provide reasonable performance with a very low profile. In addition to the 2 meter band, I use it to listen to NOAA Weather radio and have found it quite satisfactory. The window in my station wagon storage area is more than sufficient to support the antenna. I used RadioShack hook-up wire with black plastic insulation for the antenna along with RG8X coax and have had no problems so far. ■



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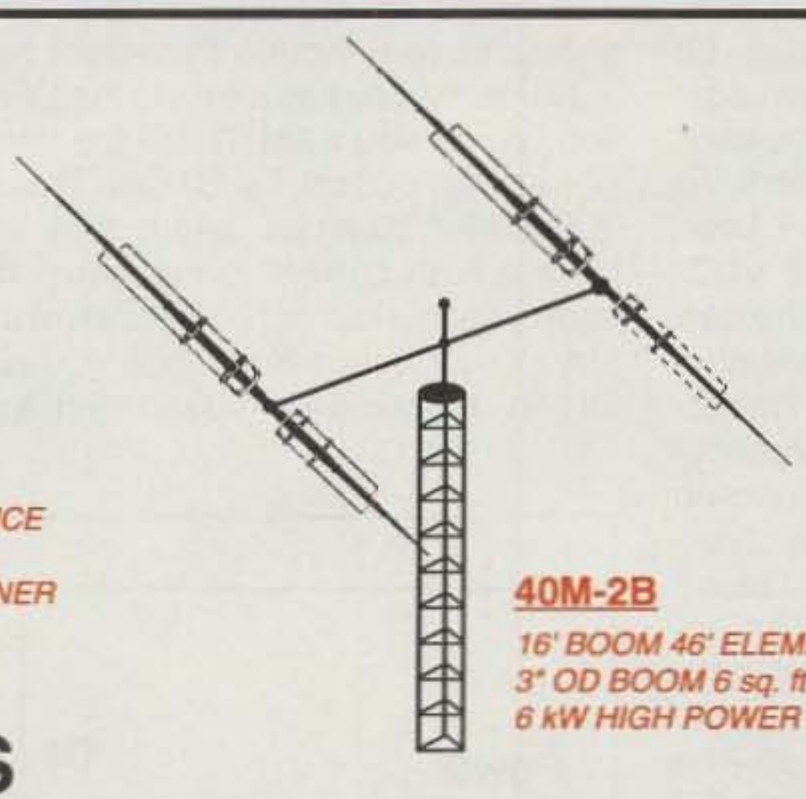

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CIRCLE 64 ON READER SERVICE CARD

Here's a quick and easy-to-build device that certainly will come in handy during emergencies.

How To Keep Your Emergency Back-up Station Battery Charged

BY PHIL SALAS*, AD5X

Surplus 12 volt, lead-acid gel-cells are becoming fairly abundant. These are great for emergency backup power for your station, or as a supplement to a low-current power supply so that you can take up any necessary power peaks required by your equipment with the battery. As an example, I've been using a 12 volt, 6 amp-hour battery across the output of a 12 volt, 10 amp small switching power supply. This permits me to run my ICOM IC-706 at full power, since the battery provides the additional peak current requirements (20 amps peak required by the IC-706).

Recently, I found a good deal on a 12 volt, 15 amp-hour lead-acid gel-cell battery. (It cost me $10!) I wanted to use this for emergency power back-up for my station. Unfortunately, these batteries can be ruined if you let them completely discharge. Therefore, you need to make sure you keep at least a partial charge on your battery. To accomplish this, I occasionally had been hooking up one of those cheap 12 VDC, 500 milliamp wall transformers to the battery in order to keep it charged. However, this has been kind of a hassle, and the battery is not convenient from an emergency-use point of view. So how do you keep these batteries charged and readily available for emergency power for your station?

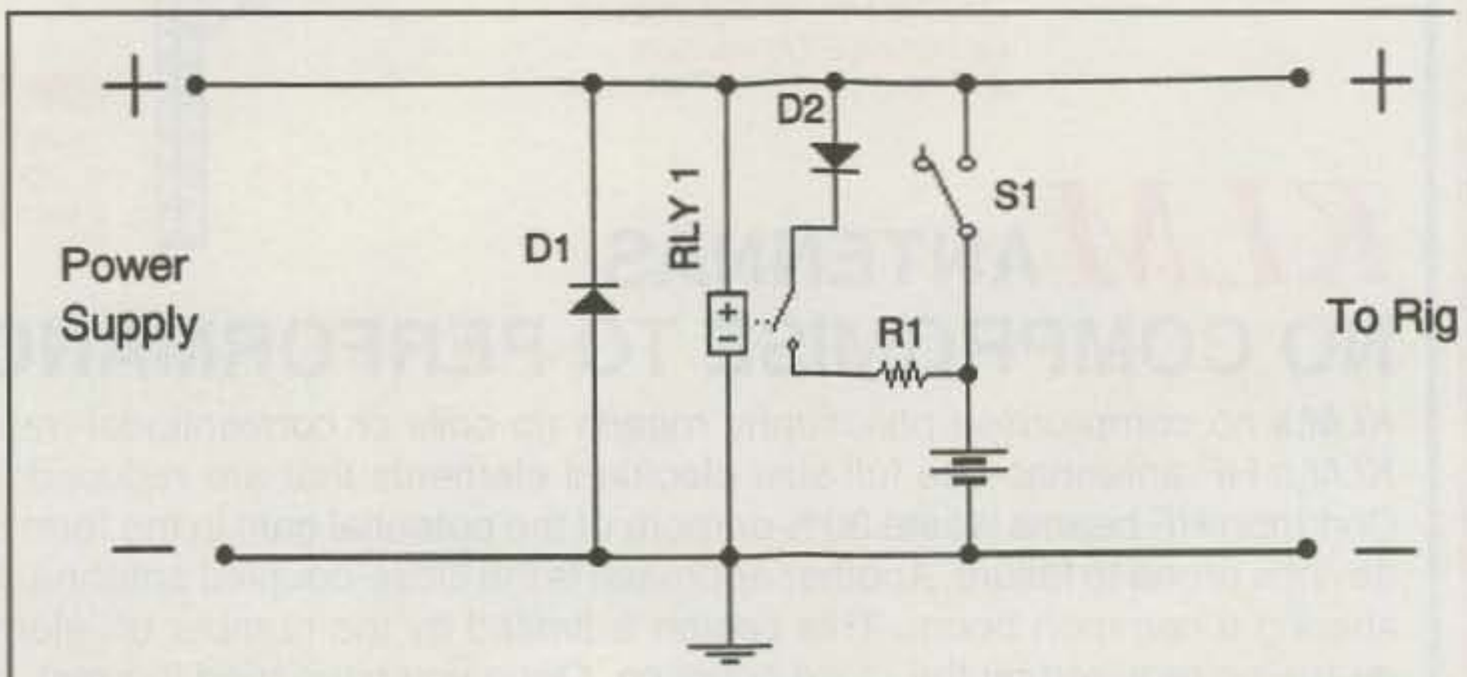
My solution is shown in fig. 1. The circuit is designed such that the battery is disconnected from the power supply when the power supply is turned off (the relay normally-open contacts are used). I did this because some power supplies have a finite output resistance even when they are off, and we don't want to discharge the battery when everything is off! The charging current is limited to about 6 amps by the 0.47 ohm resistor (this would only occur for a totally discharged battery). The relay contacts can easily handle the 6 amp maximum charging current (RadioShack mini 10 amp relay—RS 275-248). Diode D1 eliminates negative voltage pulses when the relay is de-energized. Diode D2 is needed to make the relay de-energize when S1 is OFF and the power supply is also turned off.

I built everything into a small plastic box (RS 270-231). I mounted the switch on the long side of the project box. I brought 12-gauge pendant cables (RS 278-1268) out of the project box for the power supply, battery, and station connection. I connectorized the cables with RadioShack nylon 20 amp connectors (RS 274-151 male, RS 274-154 female). These connectors are heavy-duty versions of the standard "RACES-style" connectors. I attached a short 12-gauge cable directly to the battery and connectorized it with a female connector. The battery and power-supply interface cables from the project box should have male connectors on them. The "to the rig" cable from the project box should have a female connector on it.

Normally, you'll leave S1 in the OFF position. When you want to use the battery to power your station, flip S1 ON. This switch is rated for 30 amps, and it does need to have a high current rating, since it must supply the full current demanded of the battery. You'll notice that when you turn S1 ON, the relay coil will draw current from the battery. This is only around 35 milliamp however. Incidentally, the switch is a ligl ed switch, but **don't use the internal lam** If you connect the switch ground termir (required for the switch to light), the cent pin of the switch is shorted to ground wh the switch is OFF. This would short t external power supply in this application

That's it. This circuit can now stay pe manently in line with your station powe Every time you turn on your power supp you'll be keeping the battery topped o Don't worry about over-charging the g cell. It will just "float" charge if your pow supply stays on for extended periods (flo voltage for these batteries is 13.8 VDC, t same as your power-supply output vo age). Also, don't worry about the diode vo age drop in series with the battery. As t battery approaches full charge, reduce current flows into the battery, and ther fore the current through the diode drop As the diode current drops, the diode vo age drop also becomes less. Theoreticall when the battery is fully charged, no cu rent will flow, so there is no voltage drop

Now you're all set if you need eme gency power!



Parts List

D1—1N4001
D2—6A 50PIV (RS 276-1661)
RLY1—SPDT 10A (RS 275-248)
S1—30A switch (RS 275-712)
R1—0.47 ohm 5W (RS 271-130)

Fig. 1– The battery charger circuit.

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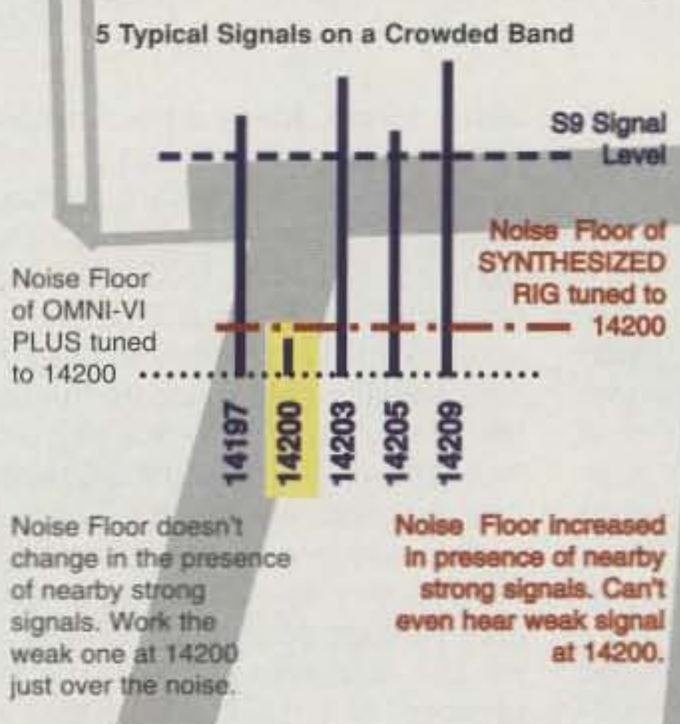

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BY KARL T. THURBER, JR., W8FX

ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

Mixed Bag

June is here, so it's time for us to clean house and share with you some of the sundry and assorted information we've accumulated in the column during the past winter and spring. We'll begin, as we usually do, with some notes on antenna products.

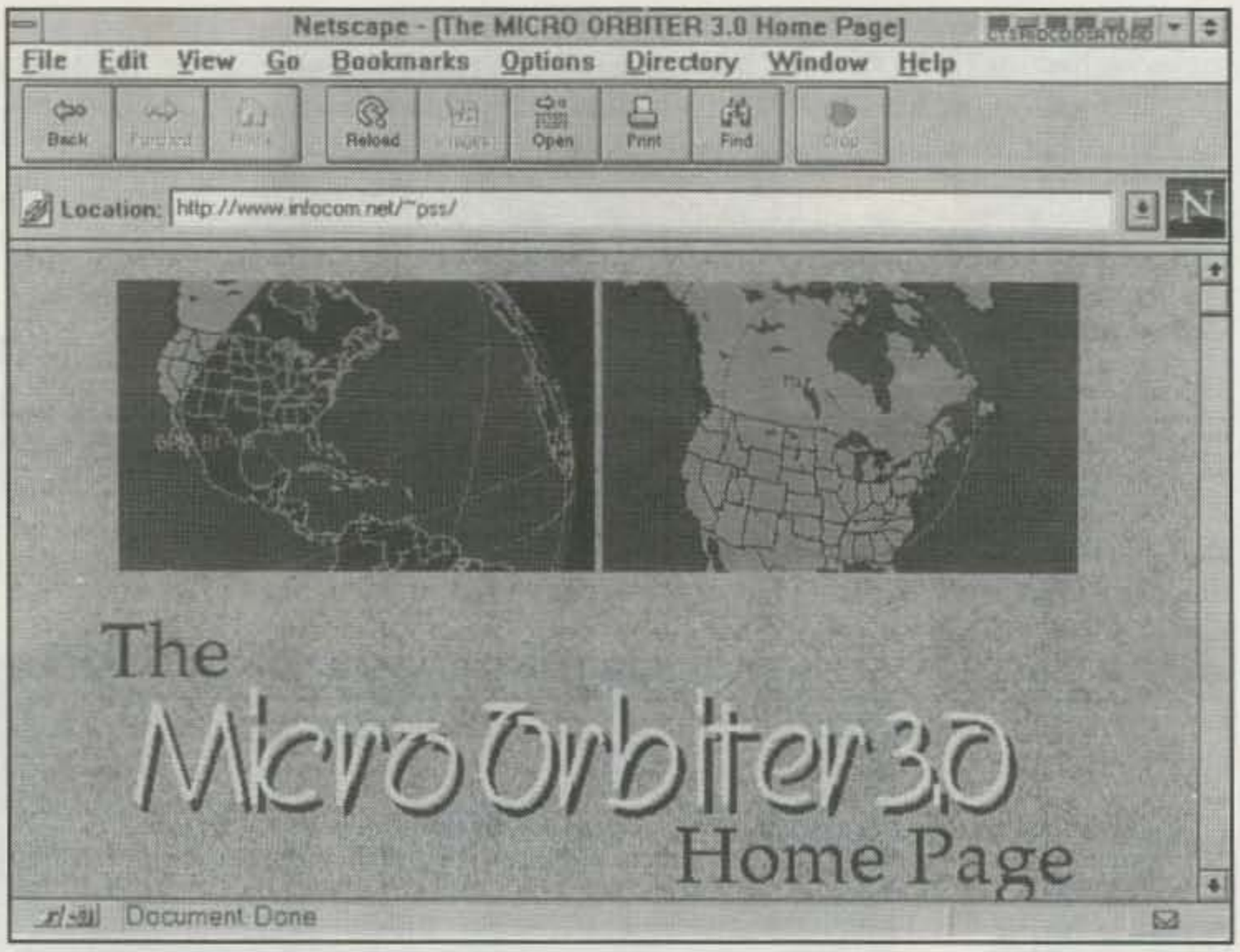

Fig. 1– The Micro Orbiter 3.0 home page. Micro Orbiter 3.0, from Precision Software Solutions, provides fast and accurate satellite data for both professional and amateur uses. The DOS-based, advanced satellite tracking software uses readily available satellite data to locate the real-time position of any satellite. You can download a limited-time demo copy of the program from the firm's Web page at <http://www.infocom.net/~pss>. You also can obtain two-line element sets for tracking satellites from the site.

Antenna Notes

Parabolic AB Microwave Gear. Recently, we became aware of a line of equipment for 1296 MHz through a "RSGB Microwave Newsletter" reprint. The equipment, offered by Parabolic AB of Sweden, primarily is for ATV and satellite work and is intended to be expandable to other microwave bands as new transverters and other gear is developed.

Designed by Lars Bertil Karlsson, SM4DHN, the system's concept revolves around a transverter, an interface, and an outdoor masthead unit that essentially is a 10 watt power amplifier and receiver preamp. The outdoor masthead unit is driven from the operating position in the radio shack through a single coaxial cable, up to 50 meters long, by the transverter and interface unit. While many amateur radio operators already use such configurations, it's the single coaxial cable carrying both DC power and RF signals that's the real attraction.

A 22 kHz tone is produced by the interface unit; the tone switches the changeover system in the masthead module. The system also can handle an extra outdoor unit controlled by the same interface. Also available are an upconverter (144 MHz/1268 MHz), an AMSAT 2400 MHz/144 MHz downconverter, and various ATV transmitters, receivers, and preamps. The Swedish company also has under development a 3 cm system and a transverter and outdoor masthead unit for 2.3 GHz.

Further details on a variety of microwave gear, and current prices, are available from Parabolic AB, P.O. Box 10257, S-434 23 Kungsbacka, Sweden.

1997 Pasternack Enterprises Catalog. In January 1992 and September 1994 we noted the Pasternack Enterprises coaxial products catalog. The firm's catalog has grown considerably in scope since the firm was founded in 1972, and it now includes well over 2000 different coaxial-related products, with hundreds of new products featured along with essential technical information on them.

The indexed, 85-page 1997 catalog has been reduced in size to 5¼" × 7" format. It shows a variety of adapters, amplifiers, attenuators, coax and coax assemblies, connectors, switches, patch cords, power dividers, terminations, tools, twinax, directional couplers, DC blocks, and other coaxial products and related items. For a free copy of the catalog, contact Pasternack Enterprises, Coaxial Products Division, P.O. Box 16759, Irvine, CA 92623 (714-261-1920).

289 Poplar Drive, Millbrook, AL 36054

Software Stuff

Micro Orbiter 3.0. Thousands of earth-orbiting satellites have been launched since October 1957, when Sputnik I was launched, to provide communications and navigational guidance, broadcast radio and TV signals, forecast the weather, explore the heavens, spy on other countries, and more. Since 1961, when the first Orbiting Satellite Carrying Amateur Radio (OSCAR) was launched, radio amateurs have communicated over thousands of miles using VHF and UHF—frequencies that traditionally are considered suitable mostly for short-distance communications.

A new amateur communications era dawned in 1983, when the first Phase III satellite, OSCAR 10, was launched. Its highly elliptical orbit allowed amateurs in the northern hemisphere to use it on a 10 to 12 hour basis over intercontinental distances. However, to effectively use satellites, you must precisely locate the satellite and determine the times when it's within range. Many software packages have been developed for this task.

Among these software packages is Micro Orbiter 3.0, offered by Texas-based Precision Software Solutions to provide fast and accurate satellite data. The DOS-based, advanced satellite tracking software uses readily available satellite data to locate the real-time position of any "satellite" in the sky, including amateur radio satellites and the Space Shuttle, Mir space station, and Hubble Space Telescope.

The software's capabilities are many. They include nine available map projections to display satellite positions, high-resolution graphics, very accurate visible path information, and printouts of positional data that you can take outside to look for satellites in the sky.

Other important capabilities include computation of Doppler shift and antenna pointing angles, specification of transmitter frequency for each satellite, display of the complete set of Keplerian and Cartesian orbital elements for each satellite, the ability to program up to 125 observer locations from a database of 18,500 U.S. sites, and an indication of whether a satellite is in daylight or in darkness. The celestial

Say You Saw It In CQ

object database includes the Sun, the Moon, and the 9000+ objects in the software's "bright star catalog."

Still other key features of the software include inter-satellite azimuth, elevation, and range data; tracking of up to 20 satellites simultaneously in both real and simulated time; the ability to set up to five rise and set timers simultaneously; display of satellite visibility circles; and display of a variety of data, including elapsed time, latitude, longitude, azimuth, elevation, slant range, orbit count, and suborbital point (the name of the geographic location directly below a satellite).

According to the firm's Chris DuPont, Micro Orbiter 3.0 is $49.95 plus $4 s/h. You can download a limited-time demo copy of the program from <http://www.infocom.net/~pss>, or contact Precision Software Solutions, P.O. Box 975, League City, TX 77574 (phone 713-538-1694; Internet <pss@infocom.net>).

Street Atlas USA 4.0. As we've pointed out, one of the big advantages of CD-ROM based software is the ability to use large databases and extensive graphics—data that otherwise would fill up a hard drive very quickly. Several capable CD-ROM products we have featured include the mapping and related software offered by DeLorme. These products have included Street Atlas USA™, AAA Map'n'Go®, Global Explorer®, and Phone Search USA™, all of which we've covered in previous columns.

The company's slick Windows flagship product, Street Atlas USA, has undergone steady development, and recently Street Atlas 4.0 was released (see our coverage of V3.0 in July 96). V4.0 includes several innovative new functions that let you navigate trips in real time and then add business and/or personal information to highly detailed, digital maps.

We won't rehash our July 96 review. However, we will say that the new V4.0 offers many useful functions held over from V3.0, such as street-level detail for the entire country; place name, ZIPcode, and street address searching; and the ability to add text, symbols, or notes to the maps.

New V4.0 features include draw functions that let you draw lines, circles, or polygons on detailed maps and measure the distances between or within them; display of ZIPcode and county boundaries; latitude and longitude searching; demographic information on ZIPcode areas; download of frequently used map sections to your hard drive; a link to the Global Positioning System (GPS), as noted below; and a connection to the Internet to let you download weather, road, construction, and special event map overlay information (at <http://www.streetatlas.com>).

Street Atlas USA 4.0 also comes with a link to Phone Search USA 2.0, a separate standalone product that is a comprehensive digital phone book containing more than 80 million residential and business numbers (see the July and December 96 columns). You can look up listed phone numbers with Phone Search USA, then locate the corresponding address detailed Street Atlas USA or AAA Map'n'Go maps. Resourceful amateurs will, of course, think of many uses to which the combo can be put.

In any case, I thoroughly enjoyed Street Atlas USA 4.0, which now sells for as little as about $45 on the street. My only real complaint is that (1) Street Atlas USA 4.0 and Phone Search USA 2.0 (about $39) aren't bundled and sold as a package, and (2) the currency and

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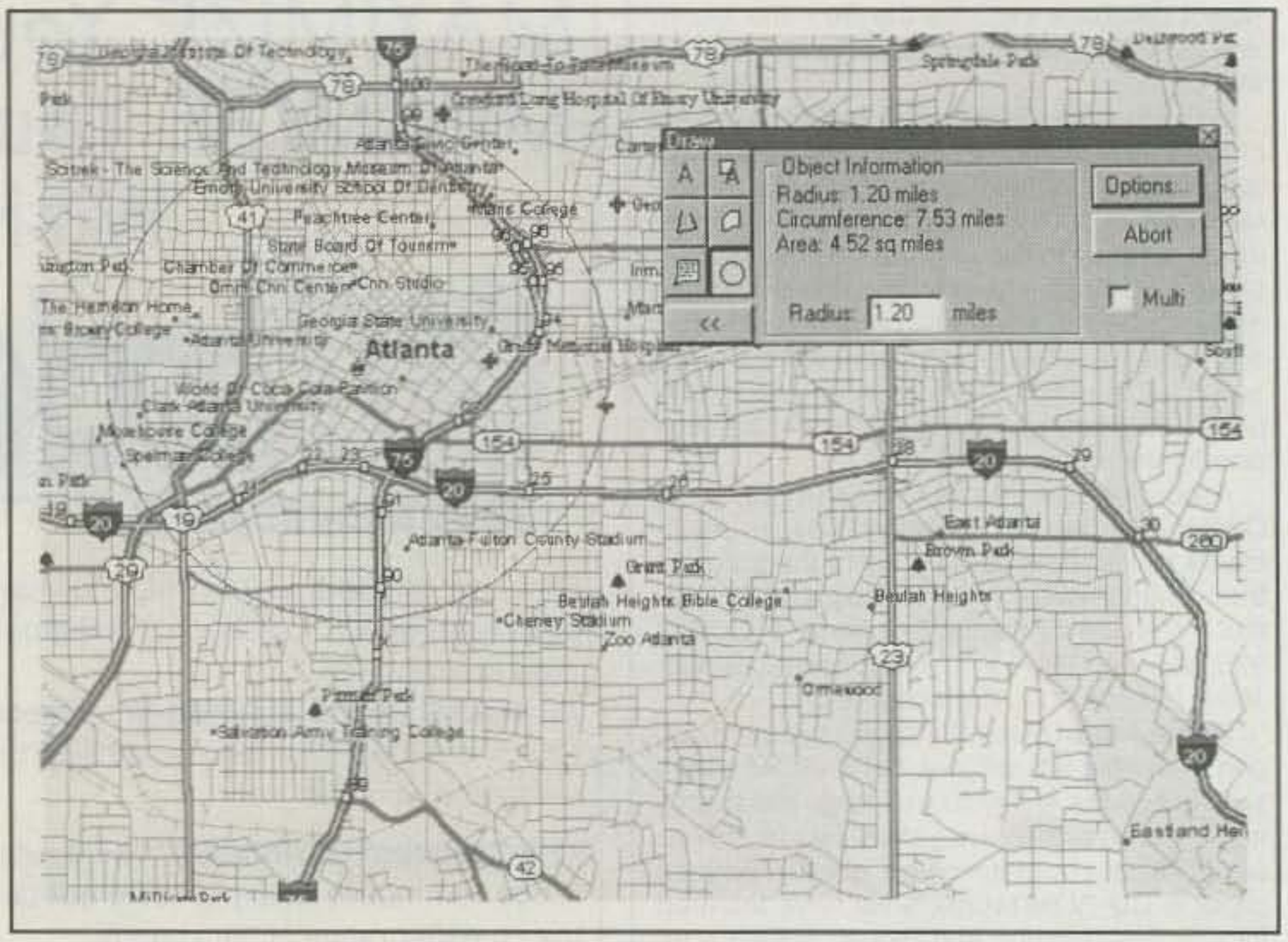


New features in Street Atlas USA 4.0 include draw functions that let you draw lines, circles, or polygons on detailed maps and measure the distances between or within them; display of ZIPcode and county boundaries; latitude and longitude searching; demographic information on ZIPcode areas; download of frequently used map sections; a link to the GPS; and a connection to the Internet to let you download weather, road, construction, and special event information. (Photo courtesy DeLorme)

accuracy of some of the map data on which Street Atlas USA relies still is questionable, as it was in previous versions. For example, my own residential area still shows both unfamiliar and strangely misspelled street names.

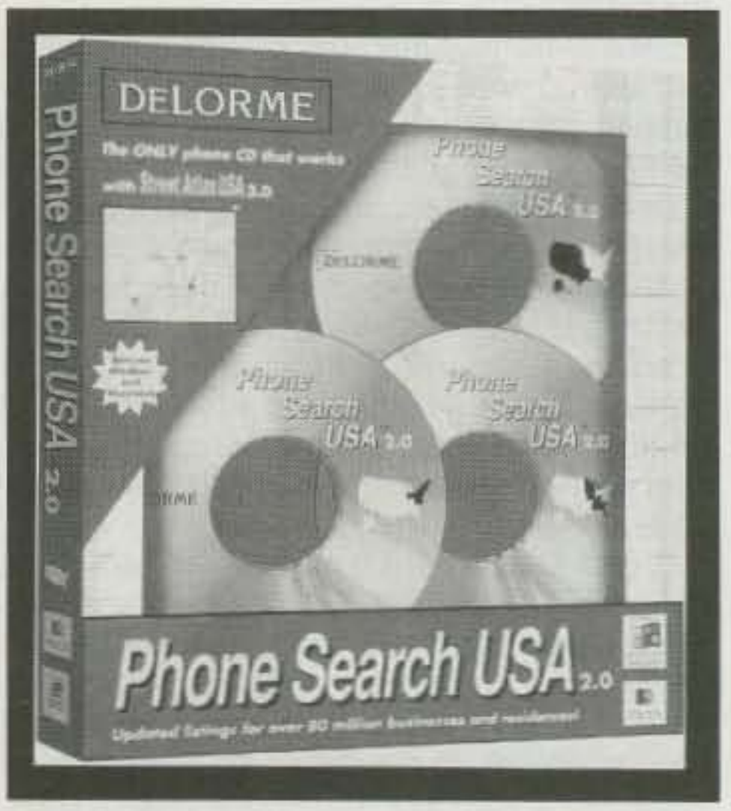
DeLorme also has come up with two brand-new products. One is Tripmate™, a complete yet quite affordable satellite navigation system that includes a very small, lightweight, 12-channel GPS reader that you place on your car's dashboard. The nifty system simply plugs into the serial port of your portable PC and comes complete with Street Atlas USA 4.0 mapping software. As long as you're within range of a least four of the 24 GPS satellites, you'll get a reading of the precise time and your latitude, longitude, and altitude.

The other new DeLorme product is 3-D Explorer USA, which offers a bird's-eye view of the continental U.S., with real three-dimensional relief created from U.S. Geological Survey (USGS) elevation data. The software lets you "fly over" real U.S. topography using a computer mouse or joystick, zooming in for a closer look anywhere in the country. It's bargain-priced at $19 and runs exclusively under Windows 95.

For more information, contact DeLorme, Lower Main Street, P.O. Box 298, Freeport, ME 04032 (phone 1-800-254-5081; Internet <http://www.delorme.com>). (The Internet site is in addition to the dedicated Street Atlas USA Web site we mentioned previously).

WinZones® News and Website Update. Last December we profiled WinZones for Windows, offered by Extend, Inc. As we said, WinZones for Windows is a PC utility that displays up to nine active clocks simultaneously on your PC screen. The clocks show the correct time for cities in other time zones while you concurrently run other application programs. You can arrange the clocks anywhere, in any size, on your screen.

As we indicated, WinZones can be especially useful if you're one of those radio amateurs whose ham shack sports several wall clocks showing local, UTC, and other key global times. In fact, you can think of WinZones as really being a 1990s computer software implementation of the multiple-clock concept, one



DeLorme's Phone Search USA 2.0 is a three CD-ROM package that's a nationwide directory of over 80 million residential and business listings. It can be used alone, but it also links directly to Street Atlas USA 4.0 and other DeLorme mapping products. It lets you look up phone listings for residences or businesses anywhere in the country, and then, in seconds, see their addresses displayed on detailed street maps. (Photo courtesy DeLorme)

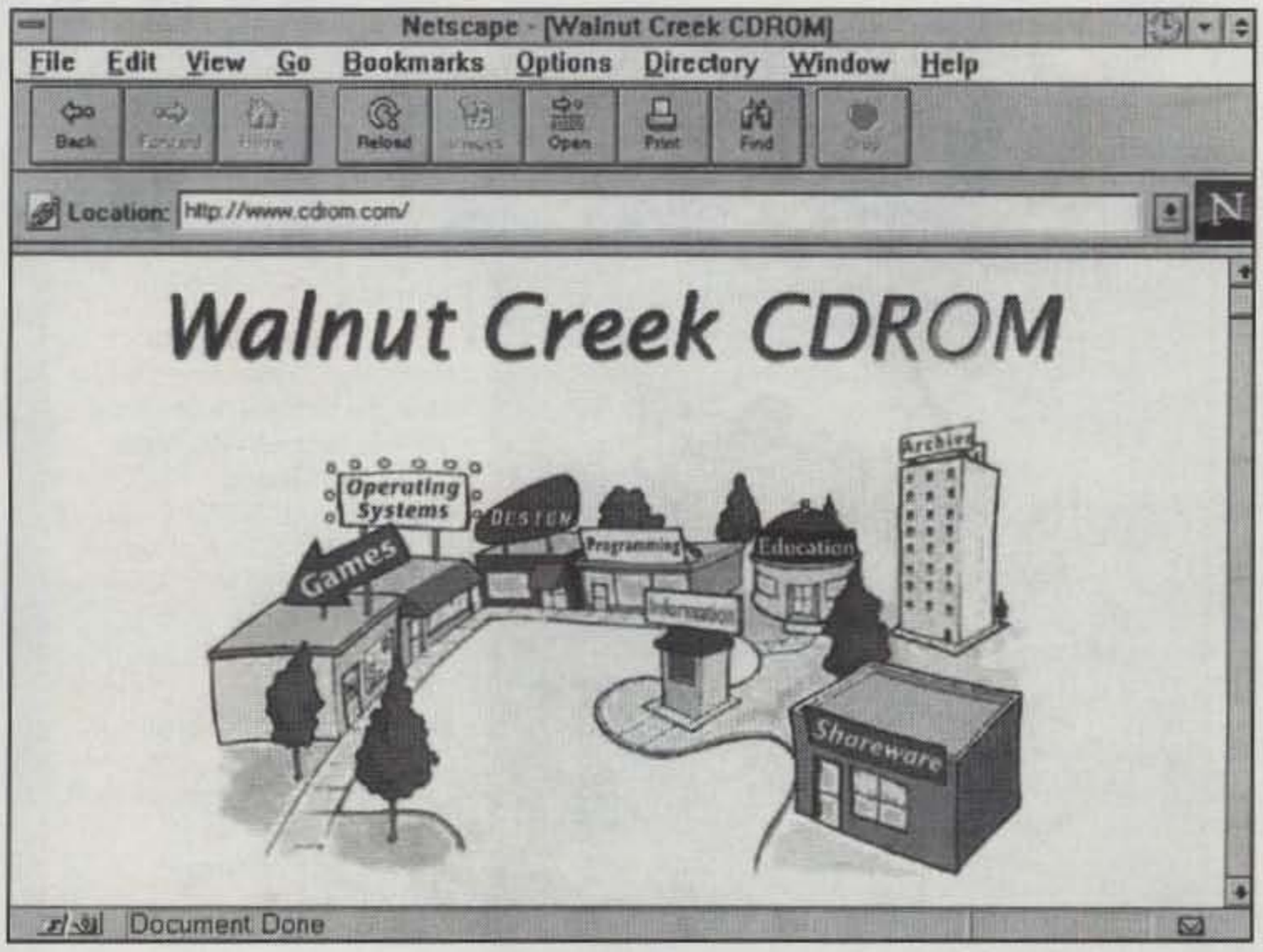


Fig. 2– Walnut Creek CD-ROM home page. If you're up and running on the Internet, check out the Walnut Creek CD-ROM Web site, reportedly one of the busiest sites on the Net. It's at <http://www.cdrom.com>, and it offers both product information and technical support. There's also the Walnut Creek FTP server at <ftp://ftp.cdrom.com>. The FTP site has tens of megabytes (MB) of "stuff for downloading" from its reported 72 GB of hard disk storage.

which eliminates the need for physical clocks. WinZones is available in separate versions for Windows 3.x and above, and for Windows 95. Either WinZones program version is $34.95 plus $3 s/h.

In a letter from Extend's Debbie Smith, she notes that WinZones has a new home on the Web where you can go to get valuable news and services, first-time users can learn about the product, and you can download ten-day "tryout versions" of the software. The new site, at <http://www.extendinc.com>, also includes free program updates, global time zone news, frequently asked questions (FAQs), published reviews, tips and suggestions, and more. In addition, Extend publishes a newsletter, "The WinZones News," which keeps users up to date on the product.

For more information, contact Extend, Inc., 4847 Hopyard Rd., Suite 3218, Pleasanton, CA 94588 (phone 510-484-0395; Internet <74024.3574@compuserve.com>).

Walnut Creek CDROM Update. It's obvious that CD-ROMs are very much in vogue today, in and out of the ham shack, and most PCs are sold with at least one CD-ROM drive unit installed. A growing number of CD-ROM publishers and distributors offer their multi-megabyte-stuffed wares, and they're not just for top-of-the-line, multimedia-equipped PCs. One such firm is Walnut Creek CDROM, which offers a rapidly growing library of CD-ROM discs of all descriptions and is quite responsive to user requests for new titles and subjects.

We first mentioned Walnut Creek CDROM in October 1992, when they offered about eight discs for sale in their catalog. Since then, their library has grown considerably. They now offer well over 80 different CD-ROMs or multiple CD-ROM sets, and many titles now also are available by subscription. A variety of computer platforms and operating systems are supported, including Windows, Windows 95, DOS, and the Macintosh.

Of special interest to radio amateurs are the regularly updated QRZ! Ham Radio CD-ROM callsign database ($29.95, or $19.95 by subscription) and the new Antennas CD-ROM (also $29.95). The latter disc offers 2000+ files and reference data on practically all antenna types. It also includes several programs to let you design and analyze antennas.

Some recent, prominently featured titles include a number of "techie" programming language and operating system discs. One is the Official Linux Slackware®, a four-disk CD-ROM set that goes for $39.95, or $24.95 by subscription. Another is FreeBSD®, a two-disc set that effectively turns your PC into a UNIX work station ($39.95/$24.95 sub). A third very popular title, but of more general interest, is CICA® for Windows; it includes nearly 2000 programs on two discs that span the full range of all that Windows offers ($29.95/$19.95 sub).

If you're up on the Internet, check out their Web site at <http://www.cdrom.com> for product information and technical support. There's also AA7BQ's QRZ! Web callsign server at <http://www.qrz.com> and the Walnut Creek FTP server at <ftp://ftp.cdrom.com>. Their FTP site has tens of megabytes (MB) of "stuff for downloading."

For a 30+ page Walnut Creek catalog depicting a wide variety of CD-ROM discs, contact Walnut Creek CDROM, 4041 Pike Lane, Suite D-906, Concord, CA 94520-9909 (1-800-786-9907). (The firm offers a nice "buy three, get one free" deal, and they also sell through sev-

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eral disc distributors, many of which offer customers substantial discounts.)

From the Bookshelf

CQ 1997 Amateur Radio Almanac. I'm sure you've noticed the in-house ads: a variety of books, buyer's guides, videos, and other amateur radio goodies are offered by *CQ.* There are also calendars, backpacks, T-shirts, and other "fun merchandise" for enjoyment of the hobby.

Now there's the updated 4th edition of the *CQ Amateur Radio Almanac,* again edited by Doug Grant, K1DG, assisted by Edith Lennon, N2ZRW, and Charlie Morrison, WZ1R. The 1997 *Almanac* bills itself as "ham radio's most comprehensive information resource," and—perhaps outside of massive (and expensive) tomes such as *The ARRL Handbook*—it likely is just that.

The *Almanac* contains thousands of facts and figures, as well as maps, graphs, photos, and more. Included in its 23 chapters in 600+ pages are the updated FCC Part 97 rules and regulations, operating tutorials, DX records, radio history, contest information, QSL bureaus, various reference tables and charts, and the like.

There's also information on 1996 in review, club listings, propagation predictions for 1997, sunrise/sunset charts, postal regs, 1997 operating events, and silent keys. It's well-indexed and has a decent table of contents, as any good almanac should. My minor criticisms of the earlier *Almanac* editions focused mainly on the too-small typeface, and largely have been corrected by going to a somewhat larger type in text-intensive sections.

Despite last year's huge increases in paper costs, which dealt heavy blows to publishers, the *Almanac* still is $19.95 plus $4 s/h. It's from CQ Communications, Inc., 76 N. Broadway, Hicksville, NY 11801 (516-681-2922).

Ramsey Catalog Update: Another Heath? It's not easy to find a company that furnishes good hobbyist kits, especially since the old-line giants such as Knight-kit, Heath, and EICO all are gone from the scene. These firms—especially Heath—prided themselves on intensive engineering, easy-to-follow assembly manuals and pictorial diagrams, free consultation, and reasonable repairs.

The "radio kit industry" now is fragmented and made up mostly of small firms, many of them cottage shops and garage operations. Predictably, kit quality varies greatly, and amenities such as those we mentioned are rare. Nevertheless, some progressive firms such as Ramsey Electronics are working to emulate the kit documentation and service standards originally set by Heath and its competitors.

Ramsey's kits are educational and fun to build. I've crafted a few myself over the past 20 years or so that they've been in the hobby kit business. Their kits include clear, step-by-step instructions that carefully guide you to a finished kit. Complete hookup instructions are provided, along with good ideas for additional uses. They also take care to see that the components are properly packaged and marked; you don't just get the proverbial "bucket of parts" often found in kits.

The 40-page 1997 Ramsey Electronics catalog (the size has about doubled in the past two years) has gone back to the familiar 8½" × 11" format. It describes many inexpensive, fun-to-build, and well-documented amateur radio and electronics hobby kits. The catalog includes amateur radio gear, antennas, personal radio broadcasters, miniature FM transmitters, video cameras and accessories, receivers and converters, test equipment, and a variety of what Ramsey calls mini, fun, and hobby kits.

Ramsey offers a ten-day examination period for all kits. As long as you don't start to build the kit, you can return it if you are not fully satisfied. Also, they have a manual preview policy where you can purchase most manuals for $5 (a few manuals are more); the manual purchase price is refundable against future kit purchase. The inside cover of their catalog also has an interesting statement about Ramsey's business philosophy.

For a free catalog, contact Ramsey Electronics, Inc., 793 Canning Parkway, Victor, NY 14564 (1-800-446-2295).

Looking Back Five

Five Years Ago in Antennas and Accessories. Okay, so now you know what the column is like for June 1997. But what was "hot" in June 1992? That column was "Software Snapshot," a column almost completely devoted to software.

In it we discussed a number of interesting software products. These included PSPLOT, a printer utility that interfaces with K6STI programs MN, YO, and NP, offered by Paul Terwilliger, NX1H; the WR9R Field Logging System, a shareware logger by Larry D. O'Cull, WR9R; the Propagation Path Calculator from Jim Mills, N5IKJ, at VVDRG Electro; the LOGic II and LOGic Jr. loggers from Dennis Hevener, WN4AZY, of Personal Database Applications; a four-function logger and hamshack organizer from Mario Signorelli, KC5IY; and MacMININEC, an NEC-based antenna analysis program for the Macintosh, from Chris Smolinski, N3JLY.

We discussed MacHam™ Radio, a no-code Technician test program generator from the Coyne Co.; a new version of IONSOUND, a propagation program from Jacob Handwerker, W1FM; the KBØZP Contest Log, from Larry Kebel, KBØZP; new QSL management and electronic calculation programs and updates from William F. Baylor, Jr., NN8Z; Private Collection, a DOS utility package from DataStorm Technologies; and Pizazz Plus 3.0, a graphics screen capture utility with a bit-image graphics converter, from Application Techniques, Inc.

We also described the HF Propagation Hotline from DX Enterprises; and one book, *Reflections—Transmission Lines and Antennas,* by noted antenna authority Walt Maxwell, W2DU. Turning to hardware, we described the VBI-360 Beam Indicator, which offers a graphic display of antenna heading and pattern, from John Hurst, KU6X, of Vector Control Systems; and several Palomar Engineers baluns.

Wrap-Up

That's all for this time, gang. Next time more Antennas and Accessories topics of current interest. See you then.

Overheard: Cheer up. From every experience—good, bad, or indifferent—there's *some* kind of knowledge to be gained.

73, Karl, W8FX

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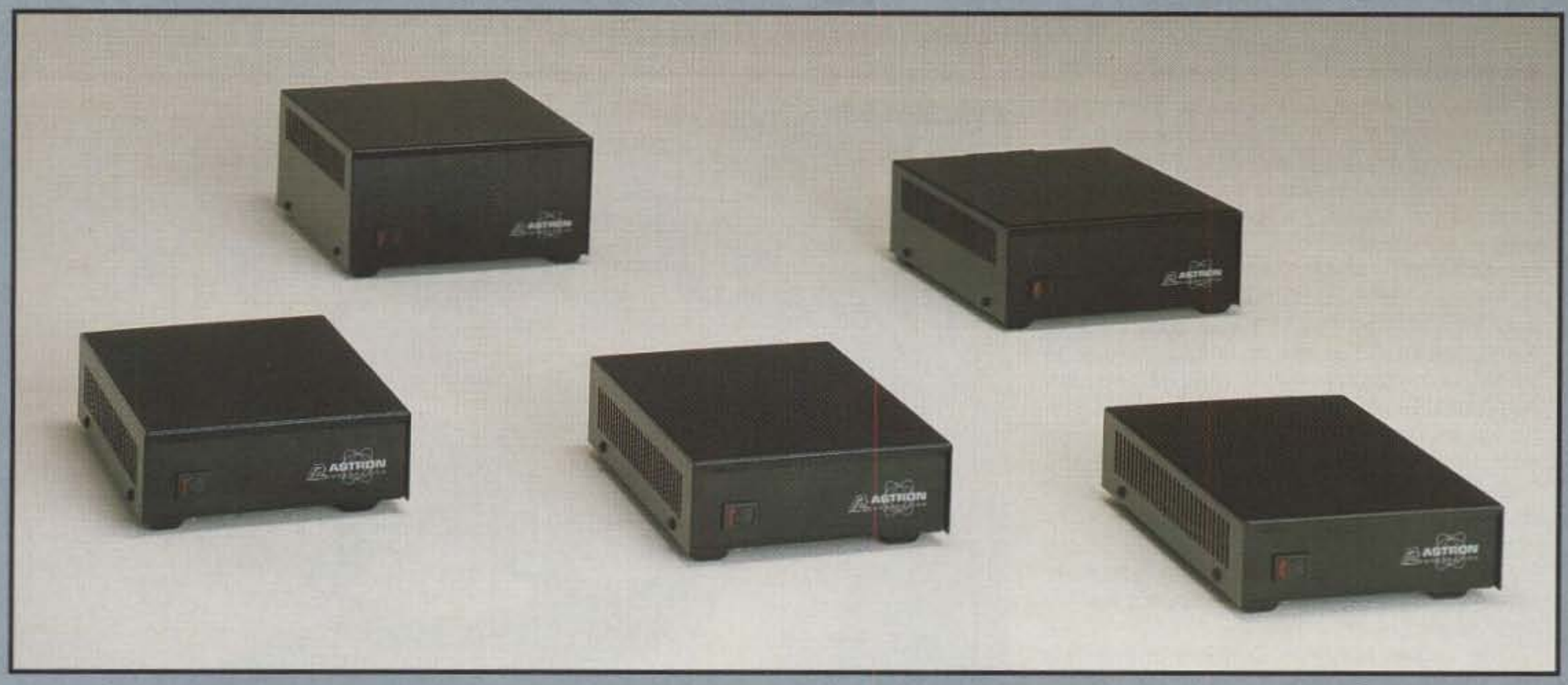

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CIRCLE 163 ON READER SERVICE CARD

BY BILL WELSH, W6DDB

BILL'S BASICS

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Onward and Upward—Part I

I am a very active code operator. However, I do not believe every applicant for the better operating privileges should have to be proficient in the use of Morse code. The existing international regulations specify that those who want to be licensed to operate on amateur radio bands below 30 MHz must prove their ability to receive the International Morse code (by ear) and to send it (by hand). These code requirements are based on the need for amateurs to be able to recognize distress and other critical communications being transmitted by code. Amateurs must be able to recognize such communications to avoid interfering with them. There is no other reason why amateur radio code tests are required internationally. In actual practice, the FCC does not meet the existing international code sending test requirement since current test procedures do not involve code sending tests.

The Global Maritime Distress and Safety System was implemented during 1993, and it becomes mandatory during 1999. It phases out the use of code in the Maritime Service. Amateur radio code tests should be phased out at the same time.

I believe it should be possible to license amateurs to operate any mode they want to use. Written examinations should be restricted to applicable rules and regulations, plus theory related to the desired mode of operation. Each mode license test should also involve demonstrating the ability to complete a contact on the air using that operating mode. Suitable band plans should be included in FCC Part 97, and they should be enforced. The current classes of licenses should be eliminated, with each class of licensee grandfathered to hold appropriate operating privileges. If you want a copy of my proposal regarding this matter, it is available for $1 plus a large (9" × 11") envelope with appropriate double postage attached to it. A brief summary is also available to anyone who sends an SASE (#10) with the request. We have reached the point where we must make major changes to our licensing requirements. We are facing a majority of amateurs who are Novices and Technicians and who are extremely limited in their operating privileges.

Tom Moeller, KBØKBE, lives in Oskaloosa, Kansas. He has retired from his local emergency management organization. Tom is the vice president of his local amateur radio club and president of his local Lions Club. He is busy trying to increase his code receiving speed to 13 words per minute to enable him to pass the General/Advanced code receiving test. Tom is active on the air and recently contacted me on the 15 meter Novice band. His station includes a Tempo 2020 transceiver and an Antron 99 vertical, plus VHF and UHF gear.

Experience

I have worked with many prospective amateurs during the past 48 years, and I have noticed that most newcomers seriously doubt their ability to master the code well enough to pass FCC licensing examinations and to use it to hold two-way radio contacts on the air. Despite this predominant early fear, I do not recall any student who was unable to learn the code. Licensing- course students sometimes tell me that they have no desire to use code on the air and that they will never touch a key after they pass the FCC code test requirements related to the license being sought. I have noticed that some of the people who express the greatest initial dislike for code turn out to be extremely good code operators who predominantly operate by code. It is unfortunate that license upgrades are so closely related to higher speed code receiving tests. However, that is the existing situation, so it is essential to become active on the so-called Novice code segments. Fortunately, we have turned the corner and are starting the climb to the peak of our next sunspot cycle. This is a great time to get active. I spend a lot of time operating in these Novice code segments and I hope to contact you soon. I am always good for a QSL card, whether or not you have cards to send.

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Code—What It Is

There are different types of code emissions. In the crowded high-frequency range (3–30 MHz) only A1A code emissions are allowed. An AØA emission is simply a wave being transmitted with no variations of amplitude, frequency, or phase. There is no intelligence on the AØA emission; it is simply a continuous wave (CW). When an AØA (CW) emission is turned on and off in a known sequence, as when code is being transmitted, it becomes A1A, which is also known as interrupted CW (ICW), CW telegraphy, or code. Such code signals are extremely narrow, and they provide extremely efficient long-distance communication capability.

Another code system is modulated code, which is designated A2A. The advantage of A2A over A1A is that it can be received using any receiver that can be tuned to the transmission frequency, whereas a communication receiver is needed to receive A1A. A1A reception requires a beat frequency oscillator (BFO) stage to develop an audible beat (difference) frequency that can be heard by the operator. The A2A signal is modulated by a suitable tone (often 400 to 1000 Hz), and that tone will be heard each time a dit or dah is transmitted, with no BFO required. The obvious disadvantage to an A2A signal is that it is much wider than an A1A signal. The wider MCW signals are not permitted in the crowded HF amateur bands (80 through 10 meters), but they are allowed on the VHF (very high frequency, 30–300 MHz) and UHF (ultra high frequency, 300–3000 MHz) bands. Some amateurs produce MCW emissions simply by keying a code practice oscillator and positioning their microphone where it picks up the code to modulate the transmitter output wave.

Although code contacts are generally conducted at the low end of each amateur band, they are legal everywhere on all amateur bands. Naturally, you are not allowed to transmit code in band segments not included in your operating privileges. However, you are allowed to make code transmissions throughout the amateur spectrum you are authorized to use for any purpose.

The International Morse code (also called the Continental code) bears that name because it is based on the English language alphabet and English is the internationally accepted language for radio use. There is no mysterious method which allows foreigners to

Say You Saw It In CQ

understand transmissions sent in the International Morse code. If the receiving operator does not understand the language in which the material is sent, she/he will have to translate it to know the meaning. Some operators still use the American Morse code, which was originated by Samuel F. B. Morse and was extensively used in wire telegraphy.

Code Advantages

Code provided the initial method of radio communications, and it continues to be popular because it is extremely effective. The transmitting and receiving equipment required to conduct two-way contacts can be relatively simple, low in cost, and easy to operate.

Code transmissions are normally very narrow, which means that many stations can simultaneously conduct different contacts using very little frequency spectrum. Simply stated, the width of the transmitted code signal is about five times the code speed sending rate. Consequently, a code transmission at 10 words per minute (wpm) would be about 50 Hz wide. To better understand just how significant this narrow bandwidth is, simply compare it to a typical single sideband (SSB) signal of about 2700 Hz or a typical amplitude modulation (AM) signal of about 6000 Hz width. The indicated relationship is as significant as the preceding figures show. You could theoretically hold 54 to 120 two-way code contacts in the frequency spectrum used by just one SSB or AM voice contact. Realistically, you would have to allow spaces between pairs of stations. The extremely narrow bandwidth characteristic of code signals does more than allow several stations to crowd into band segments. The narrow code emission allows receivers to be operated at their maximum selectivity capabilities, which means that just a small segment of frequency has to be listened to by both operators involved in each contact. Atmospherics (natural radio noise), local electrical impulse noise, and other noise is spread out fairly evenly over large frequency segments. Much of this noise can effectively be eliminated by using a narrow receiver selectivity which just allows 80 to 300 Hz of spectrum to be processed through the receiver. Simply stated, when you use high (narrow) selectivity with a receiver that includes a code (CW telegraphy) filter, you do not hear noise or interference unless it is within the very narrow frequency spectrum where you are listening.

The narrow code emission has another natural advantage that results in better communications effectiveness with code than with any other mode of emission. The transmitted code signal is packed into a narrow (20 to 300 Hz) output signal, providing an extremely potent transmission that can be received at distances and under adverse conditions where SSB and AM signals would not be heard.

Code Tests

There are two types of code receiving tests. One type involves a five minute code test run in which the applicant must correctly copy one minute of material without error; this is the long-established one minute out of five minutes code requirement. The other type of code receiving test again involves a five minute code test run; however, in this case the applicant is asked ten questions about the text he/she copied and must correctly answer at least eight of the questions to pass the test.

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The test copy does not have to show proper spacing between words, nor do all letters in words have to be correctly grouped together. A passing run can start and end in the middle of words. Since only 125 letters are included in the entire Novice/Technician-Plus code receiving test, it is impractical for the volunteer examiner to develop a reasonable comprehension test; it would involve one question based on each 2.5 words sent in the test.

Other Code Tests

The code speed requirement for General and Advanced licenses is 13 wpm and it is 20 wpm for Extra class license applicants. I was not surprised when the FCC stopped conducting sending tests, since my own experience indicated that less than one out of each one thousand applicants failed a sending test after passing a receiving test at the same speed. By eliminating the code sending test and adopting the code receiving comprehension test, the FCC has made it possible for people with no code proficiency to conduct code tests, possibly clearing the way for amateur and commercial operator's licensing examinations to be held at civil service examination offices.

Word Count System

Each letter of the alphabet has a single unit count. Each numeral, punctuation mark, and work sign (except K) has a two unit count. Each five units are counted as a word. The code speed rate is easy to calculate. Just count the total number of units sent or received in one minute and divide that total by five. As an example, if 25 letters were sent in one minute, the code speed would be 5 words per minute. Check a few code practice runs and you will quickly become familiar with determining exact code speed rates in words per minute.

Dit-To-Dah Relationship

The dah is generally said to be three times as long as the dit. This relationship only holds true at about 15 wpm. The length of the dit is constant; it is the time required to lift the wrist after depressing it to send the dit. Since it takes about the same length of time to depress or raise the wrist, the spaces between dits and dahs in a symbol are about a dit length. At a code speed of about 2 wpm, the dah is commonly about 6 times the dit length and it shortens to about 5 times the dit length at 5 wpm. The dah length is reduced to about 4 times the dit length at 9 wpm and is about 3 times the dit length at 15 wpm. The dah is about twice as long as the dit at 35 wpm and is reduced to about 1.5 times the dit length at 55 wpm. The dit length does not vary in good code, nor does the space between dits and dahs in a code symbol. The dah length does vary with code speed, as does the space between words. The space between words is basically twice the length of the dah being sent, plus one dit length. If you are sending code at 5 wpm, the space between two words should be about 11 dits long, and it is most easily obtained at this slow speed by taking your hand off the key between words.

Good code sounds smooth and pleasant at any speed. Expend the time and effort required to develop good code receiving and sending capabilities. Give yourself the option to operate code whenever you wish to do so; don't be forced into other modes of operation due to poor code ability. Properly spaced code characters sound good at even the slowest speeds. This relationship is called "weighting" in regard to adjusting an electronic keyer.

Required Code Symbols

The International Morse code symbols you must know to pass the FCC examinations are as follows:

A	.–	Alfa
B	–...	Bravo
C	–.–.	Charlie
D	–..	Delta
E	.	Echo
F	..–.	Foxtrot
G	– –.	Golf
H	....	Hotel
I	..	India
J	.– – –	Juliet
K	–.–	Kilo
L	.–..	Lima
M	– –	Mike
N	–.	November
O	– – –	Oscar
P	.– –.	Papa
Q	– – .–	Quebec
R	.–.	Romeo
S	...	Sierra
T	–	Tango
U	..–	Uniform
V	...–	Victor
W	.– –	Whiskey
X	–..–	Xray
Y	–.– –	Yankee
Z	– –..	Zulu
1	.– – – –	
2	..– – –	
3	...– –	
4	....–	
5	.....	
6	–....	
7	– –...	
8	– – –..	
9	– – – –.	
Ø	– – – – –	
? Question Mark	..– –..	IMI
, Comma	– – ..– –	MIM
. Period	.–.–.–	AAA
/ Slant Bar	–..–.	DN
Paragraph/Break (or Double Hyphen)	–...–	BT
End of Message	.–.–.	AR
End of Work	...–.–	SK
Invitation to Transmit	–.–	K

An overline or underline is used to indicate that the code symbol is composed of the indicated simple letters run together. As an example, the end-of-work symbol is . . . – . – with no separation anywhere in the symbol. When this work sign is copied, the operator simply prints SK or SK to indicate the end-of-work symbol. Obviously, it would be just as good to use VA or VA to indicate this same symbol, and this is done by some operators. In each case, if the code symbols for S (. . .) and K (– . –) or V (. . . –) and A (. –) are run together, they form the end-of-work code symbol (. . . – . –).

Additional Code Symbols

There are many International Morse code symbols which are not included in the FCC amateur code examinations but are good to know. Some of the following symbols and work signs are frequently used by amateurs, but others are almost never heard on the amateur bands.

Apostrophe	.– – – – –.	WG
Attention	–.–.–	KA
Best Regards	– –... ...– –	73
Bracket	–.– –.–	KK
Closing Station	–.–. .–..	CL
Colon	– – –...	OS
Distress Signal	...– – –...	SOS
Dollar Sign	...–..–	SX
Error Sign	..... (or)	
Error Sign	..– –..	IMI
Fondest Regards (Between Females)	...– – ...– –	33
From	.– – .	DE
General Call to All Stations	–.–. ––.–	CQ
Hyphen	–....–	DU
Keep Out	– – – – –. – – – – –.	99
Love & Kisses	– – – –.. – – – –..	88
No	–.	N
Period	.–.–.–	AAA
Quotation Mark	.–..–.	AF
Received	.–.	R
Safety Signal	– – –	T T T
Semicolon	–.–.–.	NNN
Separation Signal (Between Whole Number and Fraction)	.–..–	AU
Underline	..– –.–	IQ
Understood	...–.	SN
Urgent Signal	–..– –..– –..–	XXX
Wait	.–...	AS
Yes	–.–.	C
Zero (Repeated Use)	–	T
Repetition Sign	..– –..	IMI

Symbols such as the bracket, quotation mark, and underline must be sent to indicate where they start and end in the text.

Foreign Codes

It is legal to use known codes, other than the International (Continental) Morse code as long as all operators involved in the contact agree to the use of another code, all identifications are in the International Morse code, and a code based on an internationally recognized language is used. In other words, you cannot make up a code based on a language that is not internationally known; that would be a cipher, which is illegal. Other Morse codes include American, Arabic, Greek, Japanese, Russian and Turkish. A copy of an article which shows these other codes is available from me for $1.00 and the usual SASE. Please use the California address shown on the first page of this article.

Interim Summary

This completes the first part of this four-part article. The second part covers code practice items, taped code checks, on-the-air practice, sending tips, correcting sending errors, code tapes, handkeys, bugs, and keyers.

73, Bill, W6DDB

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THINGS TO LEARN, PROJECTS TO BUILD, AND GEAR TO USE

A Bidirectional 6 Meter Wire Beam

In the pre-Yagi days (the 1940s) prominent DXers used fixed wire beams oriented in specific directions. On the east coast a popular combination was one beam aimed at eastern Europe and a second beam aimed at Japan. The first beam covered portions of the USSR and down into the middle-east. The second covered China, Japan, and the Philippine area. Areas out of the beam paths were covered by high dipoles.

My dream in high school was to have a beam. The first requirement was a brace of poles—telephone poles. Used poles were sold by many phone companies for about 10 cents per foot. You could talk a repair crew into picking out a nice pole. They would deliver it and plant it into a hole drilled in your yard. Total cost for a 40 or 50 foot pole was $10 or less!

The wire antenna of choice was the Lazy-H (fig. 1). This consisted of a pair of half-wave antennas, with a similar pair placed a half-wave below. The configuration was fed with an open-wire transmission line.

The Lazy-H had a bidirectional pattern with about 5.8 dBd gain. That's equivalent to a small, three-element Yagi. A Yagi would have been a more flexible antenna, because it could be rotated to any heading. However, in that time frame, information on Yagis was not readily available, and aluminum tubing was impossible to obtain, unless you lived near a southern California aircraft manufacturer and had access to surplus stock.

Close in popularity to the Lazy-H was the "flat-top beam," designed by W8JK. This compact wire beam antenna was used by a lot of fellows who didn't have room for a Lazy-H. But even the DXers equipped with multiple 8JKs envied the Big Guns with the Lazy-H beams.

So it was until World War II ended. After the war, when aluminum tubing was available at $2.00 per length and surplus RG-8 coax could be had for 6 cents a foot, the wire beam faded into obscurity, and the Yagi became the antenna of choice for most amateurs working the HF DX bands.

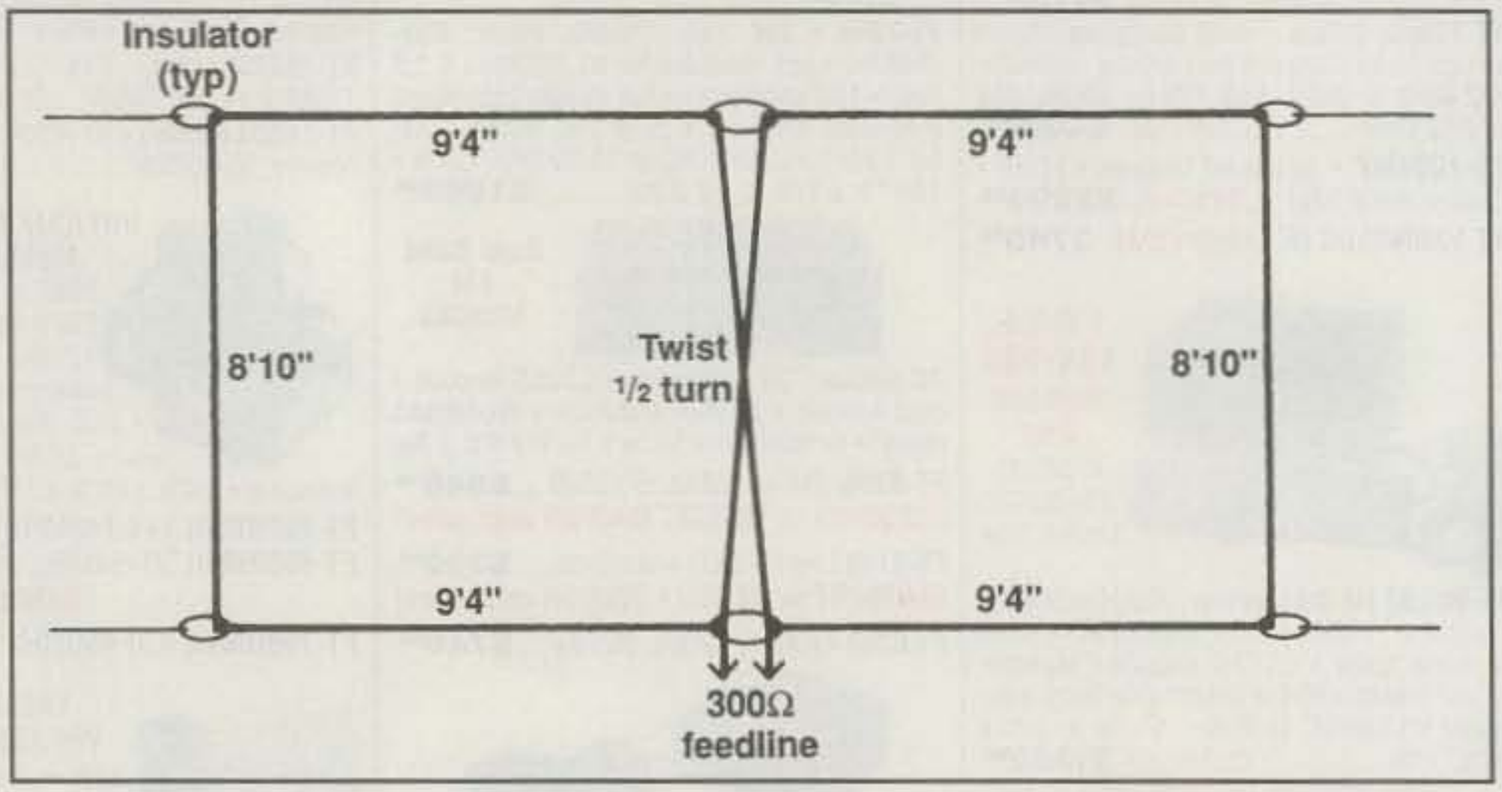

Fig. 1– The "Lazy-H" beam for 6 meters. The twisted transmission line is 450 ohm "ladderline." The beam fires into and out of the page.

Reviving Interest in Wire Beams

The wire beams occupy only a passing mention in most antenna handbooks. However, some alert 6 meter operators saw merit in wire beams. They were cheap, they were quite small, and they were nearly invisible.

The Lazy-H beam could be expanded by adding additional sections to it (fig. 2). These arrangements were developed about 1926 by engineers of the Bell Telephone System for their overseas HF radio links.

The key for maximum array gain and maximum bandwidth was to make the antenna symmetrical about the feedpoint. Additional experiments showed that with proper instrumentation, the array could be fed off-center (fig. 3), but this was not an approach to be taken casually. If not done properly, especially with respect to the feedline, antenna current phasing would suffer, along with antenna pattern and gain.

All things considered, the basic Lazy-H was a forgiving broadband beam. Larger arrays, in the main, were left to the professionals.

Interest in wire beams has recently been revived—not in the HF DX bands, but in the quasi-VHF band of 6 meters.

A Practical 6 Meter Wire Beam

The Lazy-H is an attractive 6 meter beam. It provides good gain and wide operating bandwidth. Part of the gain is provided by the stacked elements sharpening the pattern in the vertical plane, and the rest from the in-line elements narrowing the pattern in azimuth. Overall beam length is about 19 feet.

An effective use of the Lazy-H is for a repeater located near a busy interstate highway. The beam "fires" up and down the highway, restricting the pattern to where it is most useful.

The azimuth plot of the array is shown in fig. 4. It may be tempting to add more loops to form a so-call "curtain" array, but the additional gain is achieved only by pattern sharpening. Since the plot of the Lazy-H is about 50 degrees between the –3 dB points, the curtain would prove to be impractical, other than for a point-to-point situation.

Building The Lazy-H

It's easy to build this 6 meter beam. I made mine of #16 AWG enamel-coated, single-strand copper wire. Six insulators are required. The upper and lower wires are cross-connected by a transmission line made of a length of heavy-duty ladder line (sometimes called "window line"). The line I used was 450 ohm, 16 AWG, 19-strand copper-clad steel. It is quite flexible, easy to use, and less prone to bending fracture than single-strand wire.

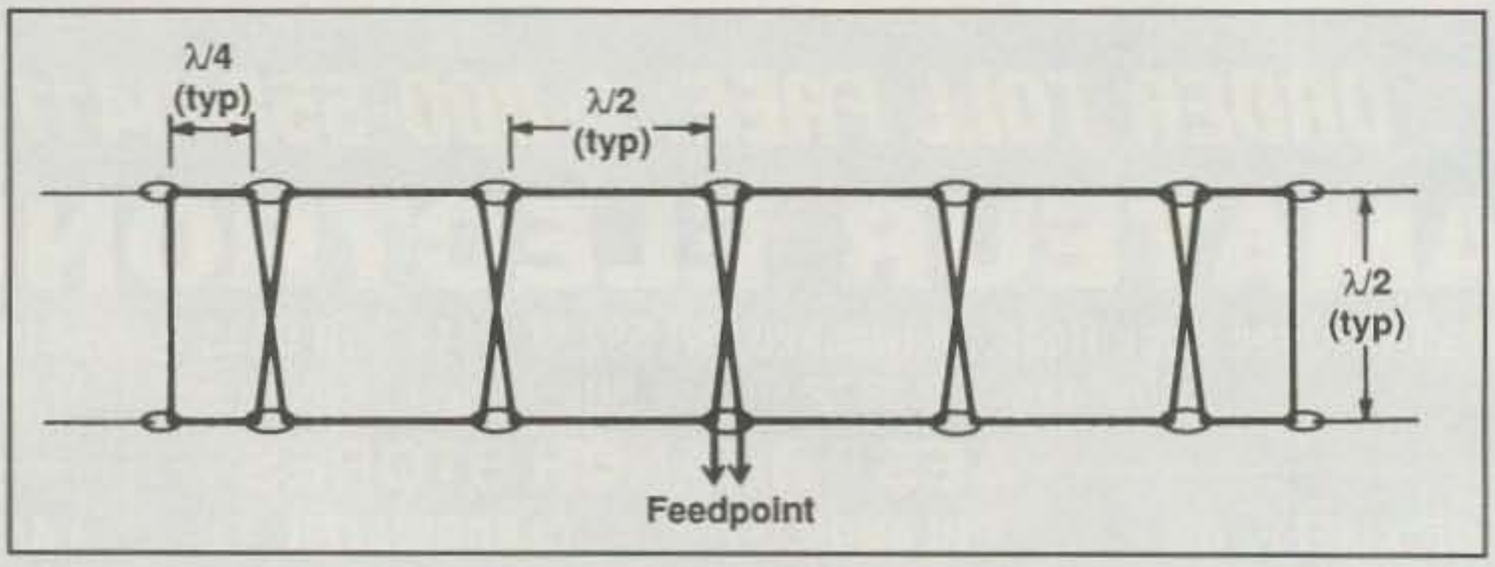

Fig. 2– Additional sections added to the Lazy-H provide a high gain, narrow beam for point-to-point service.

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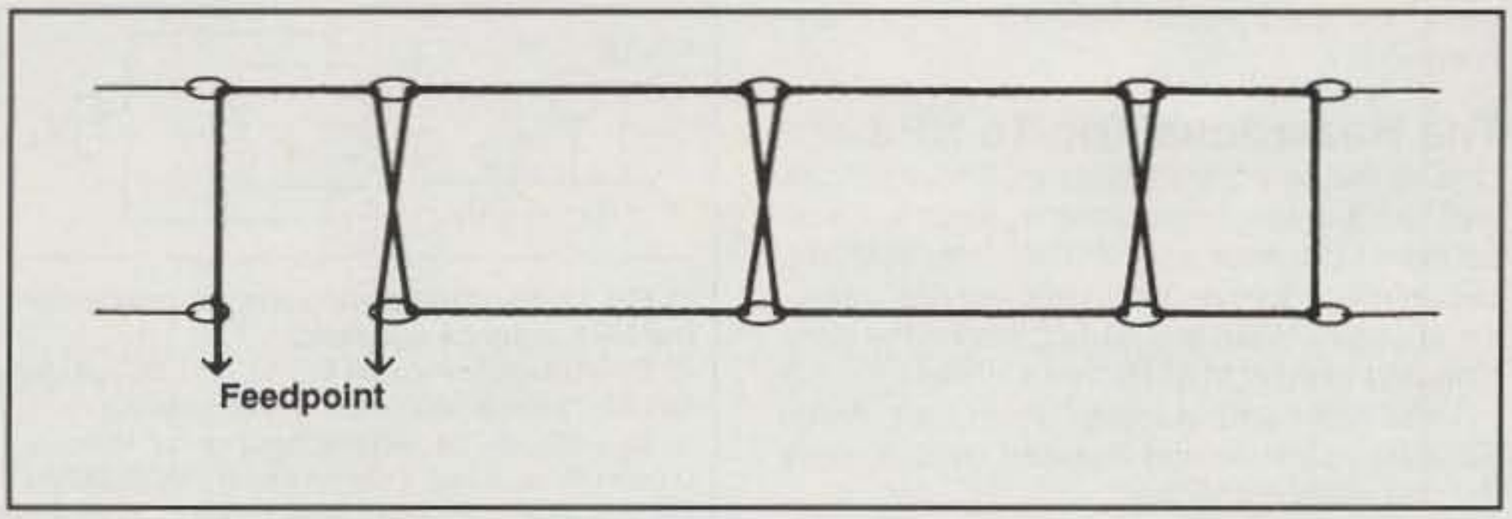

Fig. 3– Feeding the antenna at one end is tricky, as it is difficult to maintain proper phase relationships.

Remember when you build the antenna to allow enough extra wire length in the sections to wrap around the insulators and to join the adjacent section of the antenna. Solder all your connections.

The best construction technique is to assemble the beam at eye level, between two temporary supports. I used the garage and a handy nearby tree. It was easy to build the antenna, which is supported in the vertical plane.

Feeding The Antenna

A 300 ohm ribbon feedline is used, connected across the bottom center insulator. As the feedpoint impedance of the antenna is about 350 ohms, the SWR on the feedline is quite low, as is the line loss.

Since modern 6 meter equipment is designed for a 50 ohm feed, a simple antenna tuner is required at the station. I don't think you can buy one for 50 MHz, but it is easy to build one. Fig. 5 (taken from *The ARRL Handbook*, 41st ed., 1964, p. 452) is a suitable circuit. You can wind the coils yourself, but you'll have to go to the junk box for the variable capacitors. Capacitor C2 resonates the tuner and C1 controls loading. Start with low power and with C1 set at mid-scale. Tune C2 for better loading, and then vary C1 to obtain maximum load. Jockey the controls a bit for touch-up, and you're all set to go. An SWR meter between the tuner and the exciter is helpful.

My tuner was built breadboard-fashion on a small piece of 1/2 inch plywood, with a 3/16 inch Masonite panel. The original *Handbook* design used commercial coil stock, with L1 slipped inside the tuned coil, L2. The coils are supported by their leads, with L1 mounted directly to the tuning capacitor.

Using The Antenna

The antenna should be aimed broadside to the directions you wish to cover. The pattern is bidirectional and sharper than a dipole. Common sense tells you to get the antenna as high in the air as possible. I'd shoot for a height of at least 20 feet to the bottom wires. Since the array is less than 20 feet long, that should not pose a problem.

"Project Coldfeet"

In the late 1950s the U.S. military took note that the Soviet Union had been using drifting ice stations in the Arctic since 1937. This was no

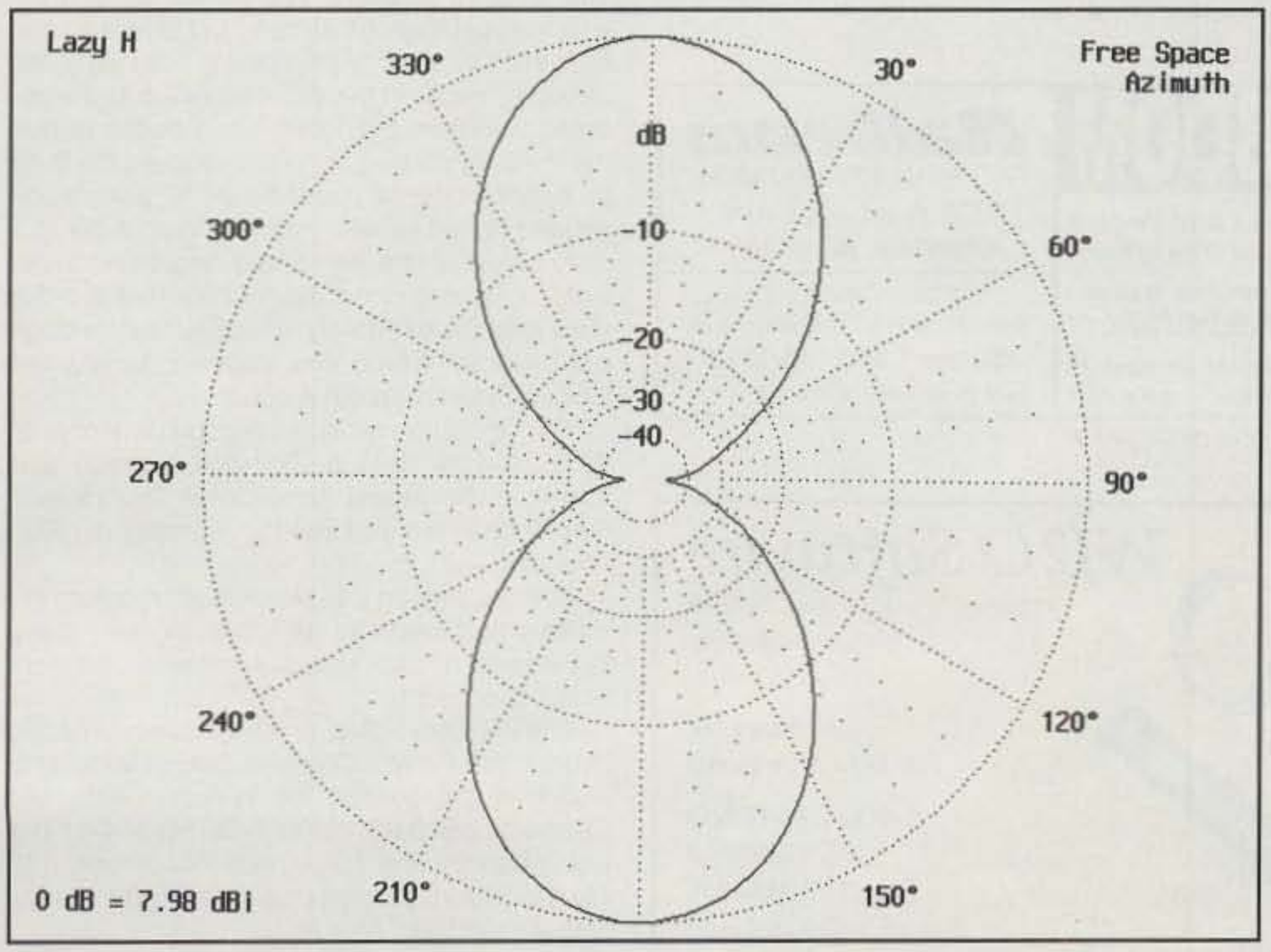

Fig. 4– Azimuth plot of the Lazy-H beam.

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secret, but the U.S. was not particularly interested in the polar region, until it became apparent that missiles fired over the North Pole at the U.S. were a threat to national security. Suddenly, military interest in the northern polar area exploded, and various floating ice islands were investigated as a possible polar scientific site (see my column in the April issue, p. 52). It was also thought that an ice island could be a sonar listening post for atomic submarine operation in the polar sea.

What had the Russians been doing since their first drifting ice station (North Pole 1, or NP1) was activated in May 1937? A lot of data about the polar observations had been published by the Soviets in scientific journals. Now, in 1961, they were up to ice station NP10!

What was the purpose of the ice stations? A good guess could be made, but it would be advantageous to eyeball a Soviet station. How could this be accomplished?

In 1962 a hastily abandoned ice station, NP8, was spotted. The ice pack was deteriorating, and the Soviet personnel had been airlifted out. Would it be possible to land a team of American researchers on the crumbling ice island and get them out before the station disintegrated?

The Hazardous Trip To NP8

One of the key participants in "Project Coldfeet," as the daring operation was named, was Leonard LeSchack, ex-W2BFW, later W4RVN. LeSchack, a former Naval Intelligence operator, spoke Russian and participated in the planning and execution of Project Coldfeet.

LeSchack and James Smith, an Arctic Survival instructor and Russian linguist, were the members of the team.

On May 28, 1962 a USAF B-17 from Barrow, Alaska flew over NP8, and LeSchack and Smith parachuted down onto the ice island. A series of cargo drops followed. Smith erected a UHF radio beacon, and the two men set about establishing camp in the deserted Soviet buildings.

The next day LeSchack set up the radio equipment, borrowing the existing Soviet antennas. The arrangement was that NP8 and Barrow would monitor designated channels twice daily, but would not transmit unless there was something urgent to report.

After a few days LeSchack deemed it necessary to send a summary weather report to Barrow. The channel used was just outside the low end of the 20 meter amateur band, so LeSchack used his own call, W4RVN, to send a one-way message to Barrow.

By May 31 the investigation of the ice station was complete, and a package was made up of various logs and charts left behind by the hastily departed Soviets. The problem was how to get the investigators off the soft ice, which could not support the weight of a rescue plane.

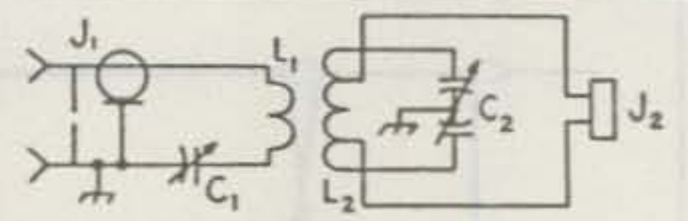

Fig. 17-30—Circuit and parts information for the v.h.f. antenna couplers.

C_1—100-µµf. variable for 50 Mc., 50-µµf. for 144 Mc. (Hammarlund MC-100 and Mc-50).

C_2—35-µµf. per-section split-stator variable, 0.07-inch spacing (Hammarlund MCD-35SX). Reduce to 4 stator and 4 rotor plates in each section in 144-Mc. coupler for easier tuning; see text.

J_1—Coaxial fitting, female.

J_2—Two-post terminal assembly (National FWH).

L_1—50 Mc.: 4 turns No. 18 tinned, 1-inch diameter, 1/8-inch spacing (Air-Dux No. 808T).

114 Mc.: 2 turns No. 14 enam., 1-inch diameter, 1/8-inch spacing. Slip over L_2 before mounting.

L_2—50 Mc.: 7 turns No. 14 tinned, 1-1/2-inch diameter, 1/4-inch spacing (Air-Dux No. 1204). Tap 1-1/2 turns from each end.

144 Mc.: 5 turns No. 12 tinned, 1/2 inch diameter, 7/8 inch long. Tap 1-1/2 turns from each end.

Fig. 5– Circuit of ARRL Handbook *antenna coupler for either 50 or 144 MHz.*

The Skyhook Pickup

After a few false starts, a B-17 finally reached NP8 on a clear day. It had a hair-raising rescue system aboard, known as "Skyhook," which would snatch the men aloft, one at a time, by means of a tether attached to a helium-filled balloon. In spite of the gathering wind and worsening weather, the information package and the investigators were hoisted aboard the B-17 as it made several passes over NP8—mission accomplished without injury or loss of life!

Analysis of the notes and photos retrieved from NP8 convinced the military that the Soviets had an extremely effective meteorological program which was superior to any the United States had developed.

The operation received a good deal of publicity, and in 1965 a Skyhook scheme was shown in the James Bond movie *Thunderball*. Rent it on video and see for yourself how Skyhook worked!

Today Leonard LeSchack is retired from the military and owns an oil exploration company in Canada. It is not known if he has an amateur ticket at present.

The full story of this amazing operation is told in the book *Project Coldfeet, Secret Mission to a Soviet Ice Station*, by William Leary and Leonard LeSchack (ISBN 1-55750-514-4). It is published by the Naval Institute Press, 118 Maryland Ave., Annapolis, MD 21402 (phone 800-233-8764).

73, Bill, W6SAI

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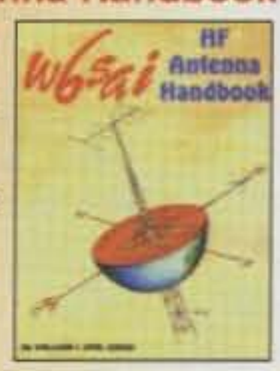

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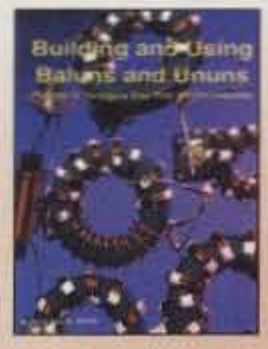

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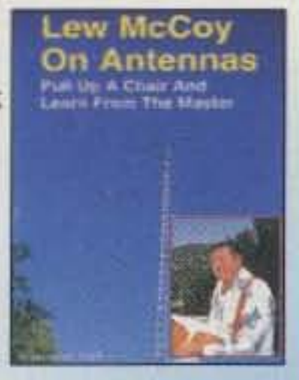

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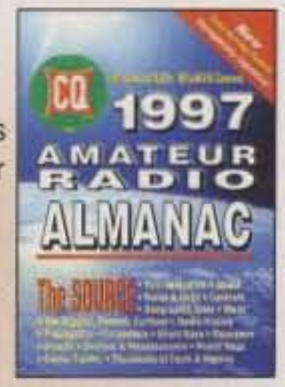

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BY BUCK ROGERS, K4ABT

PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

Setting "Fixed" Node Paths

Ask any system node operator (SNO) about node configuration, and you may discover a wealth of knowledge and learn that this art is alive and well. In this month's "Packet User's Notebook" we will pass along some of the techniques employed in configuring nodes. Partial credit goes to Dave Salaman, NØEIR, for his papers on network node configurations. Our thanks goes to Mel Whitten, KØPFX, for supplying us with Dave's papers. Here in the Southeastern Emergency Digital Association Networks (SEDAN) we fully support the configuration techniques contained in the NØEIR Standards proposal.

This information will be especially helpful to the new and aspiring system node operator (SNO). Most of the discussion is built around the X-1J4 node parameters and mode command set.

Node Routing Basics

Nodes are dumb! Several system node operators and packet radio authors in other publications have stated that nodes are intelligent and should be left to attend to the so-called "automatic routing" to and from all their neighbors. Nothing is further from the truth!

What happens when long ground wave and extended nighttime "lifts" occur, and then later the band changes or daylight returns the VHF F1 and F2 layers to short-range propagation? The so-called "intelligent" group of network nodes has gathered large node lists that are no longer heard. We quickly learn that nodes are not so intelligent after all. This, then, is the point where we begin our next level of node education. Rather than lock out the nodes we don't want, why not "lock in" the nodes we do want as neighbor nodes?

I've listed several ways to make the decision as to which nodes are neighbor nodes and which nodes should be locked in! This kind of node housekeeping is called "locked routing." It removes the guesswork that occurs when the routing is left to the so-called "automatic routing" built into the node firmware.

When you first set up your LAN (1200 baud) node on the network (not the backbone), or just after you perform a "cold-start" (hard reset = RESET*), set the first 7 of the 26 parameters as follows:

P **100 81 81 255 8 5 1800** 16 180 3 2 60 4 4 900 64 10 5 4 10 200 0 0 0 1 1

While you are in the sysop command level, set the MHeard list to 10 or 20 (for example: MH 20 <Enter>).

Let the node operate this way for about 24 hours. Once it has had ample time to gather a reliable routes table (notice I said *reliable*), then look at the routes table (not the nodes list) between the hours of 2:30 PM and 5:30 PM EST (I'll explain the time of day in the next few paragraphs.) and make a record of the routes table that is displayed.

211 Luenburg Drive, Evington, VA 24550
e-mail: buck4abt@inmind.com

```
PARAM  100 81 81 255 8 5 1800 16 180 3 2 60 4 4 900 64 10 5 4 10 200 0 0 0 1 1
MODE   0 0 6 3 0 30 0 450 3 600 1 27 0 0 1 0 3
```

Fig. 1(A)– Node parameters used in the SEDAN 1200 baud nodes. Neighbor node paths are locked at 192. Neighbor "gateway" nodes, via port 1, are locked at 255 (RS232).

```
PARAM  100 162 162 255 7 5 1800 16 180 3 2 60 4 4 900 255 1 1 4 10 40 0 0 0 1 0
MODE   0 0 6 3 0 15  0 400 0 600 0 27 3 0 1 0 0
```

Fig. 1(B)– Node parameters used in the SEDAN 9600 baud backbone nodes. Neighbor node paths are locked at 240. Neighbor "gateway" nodes, via port 1, are locked at 255 (RS232).

Next I download the MHeard list of the same node and note which of the nodes in the MHeard list display the highest number of received repeat numbers. By "received repeat numbers" I'm referring to the number of consecutive times the node to which we are connected has heard its neighbor nodes, as shown in the MHeard list which follows.

```
cmd:*** CONNECTED to 77
77:WB4EDZ-7} Candlers Mtn, Virginia; Type I
   for INFO or H for SEDAN histogram

m
77:WB4EDZ-7}
Callsign     Pkts  Port  Time     Dev.  Type
K4ABT-8       330     0  0:0:0    3.2   Node
KC4SUE-7      297     0  0:0:2    3.9   Node
KD4BNQ-7        9     0  0:0:6    4.1   Node
MTLAKE          4     0  0:0:9    3.8
WB4EDZ-9     1024     1  0:0:27         Node
```

Next I lock in those neighbor nodes which display a large number of repeat receive numbers—usually the top three or four highest node numbers in the list. Yes, there is the chance that you can be mislead by high numbers that are caused by heavy activity on or through the node(s). Any node shown in the MHeard list that displays a high number of repeat receive packets, I set (lock in at 192) into the node using the "routes lock" technique shown next:

R 0 [neighbor node] + [route quality]

Because I know a very good route exists between nodes 77:WB4EDZ-7 and 1200:K4ABT-8, I lock the route between 77 and 1200 in the following manner:

R 0 K4ABT-8 + 192

As a rule, I don't lock a route to a node that has a receive repeat number below 10 unless that node route is the only node in the route table, or all the routes show low receive repeat numbers in the MHeard display. Even then I try to use a common-sense approach and note the proximity and connectivity of the nodes I lock in.

The syntax of the ROUTES command is as follows:

R 0 [neighbor node] + [route quality]

Route Port [Callsign/SSID] + Quality
Route = command
Port = port number (0 = radio & 1 = RS-232)
Callsign = Neighbor node Call/SSID
+ = plus sign
Path quality = 192 for 1200 baud LAN nodes
(240 for 9600 baud backbone nodes)

Shown next is a ROUTES list from node "77: WB4EDZ-7." While I'm connected, I issue the "R"outes command. In the example following, the ROUTES list will indicate the nodes I've locked in by displaying an exclamation mark at the end of each locked route. The node returns:

```
77: WB4EDZ-7} Routes:
0 DFVA:N4OMC-1  192          14!
0 1200:K4ABT-8  192          12!
0 MTLAKE:KD4BNQ-7  51         3
0 MVA:KC4SUE-7  192           6!
1 WB4EDZ-9  255              21
```

1. When determining which node is truly a neighbor node, use a common-sense approach. By this I mean look at the number of times the neighbor node is heard, and try to make the determination at a time of day when propagation is low. I find this time to be between 2:30 PM and 5:30 PM eastern time.

2. Pick your real neighbor nodes from the routes table and lock them in at the recommended default quality (192 for 1200 baud and 240 for 9600 baud backbones).

3. Where there is a "gateway" (two nodes connected via RS-232) neighbor node, lock these routes at 255. If you are locking three nodes in a node stack (via RS-232 using a diode matrix), set each of the locked routes at 245. Remember that 240 is the locked route quality for neighbor "backbone" nodes.

Say You Saw It In CQ

4. Maintain Parameter 3 (default radio link quality given to new nodes) to a value equal to Parameter 2 (minimum quality to accept).

5. Be sure to contact the system node operator of your neighbor node to be certain he uses the same path lock quality and locks his node back to your node. Cooperation between SNOs is essential here.

Note: When locking RS-232 routes, remember to use the 232 port number 1 (one) instead of the radio port number 0 (zero) (for example: R "1" K4ABT-2 + 255).

To give you a better understanding of how it works, keep in mind that the physical neighbor node is not always the authentic, or real, neighbor node. In the examples given here, the real neighbor nodes will have the full quality value that you have assigned to them. You say, "But Buck, nothing has really changed here." Okay, but notice that by reducing parameter 3 to the same level as parameter 2, new nodes that are heard are given a quality on the threshold of acceptance. This means that the new nodes in the broadcast will have their name and callsign entered into the node list, but all their node path information will have qualities too low to be shown or used. Only the node itself will be allowed into the node list with nodes comparable to the routing. Because the node is at the point of quality acceptance, it won't expand to other nodes because its quality is degraded to a point that will fall below the minimum quality of neighbor nodes. The purpose of "locking" the qualities of your real neighbor nodes is to preserve their quality rating as true neighbors. If one of your true neighbors goes down, it will be removed from the node table. However, it will not be removed from the "locked routes listing" unless you remove it.

To delete a locked route listing use the minus (–) sign where you used the plus sign (+) in the routes listing. Here is an example of how I would remove the locked routes we entered earlier (quotation marks are mine):

R 0 K4ABT-8 "–" 192

It is vitally important to the proper operation of the network that each SNO who locks in a route to a neighbor node (not his own) notify the neighbor node SNO that he has done so. Ask the neighbor node SNO to lock his node in using the same locked route quality as you have used. This ensures good link quality and fewer retries between nodes. In many cases it prevents the familiar "RETRIED OUT AT NODE... "

Try It; You'll Like It

Before the know-it-all node gurus get set to US mail and e-mail me with a lot of whining, complaining, and grumbling, take a few days to try what I've written here. These parameters are tried and proven. *They work!* In the Southeastern Emergency Digital Association Networks (SEDAN) we have nearly 200 nodes operating in Alabama, Florida, Georgia, Kentucky, Maryland, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia. This network is more than a vehicle for saving lives and protecting health and property during disasters. It also served as the ideal "alpha and beta testbed" to refine the parameters shown in this column, to the point where we now have almost seamless continuity across the network.

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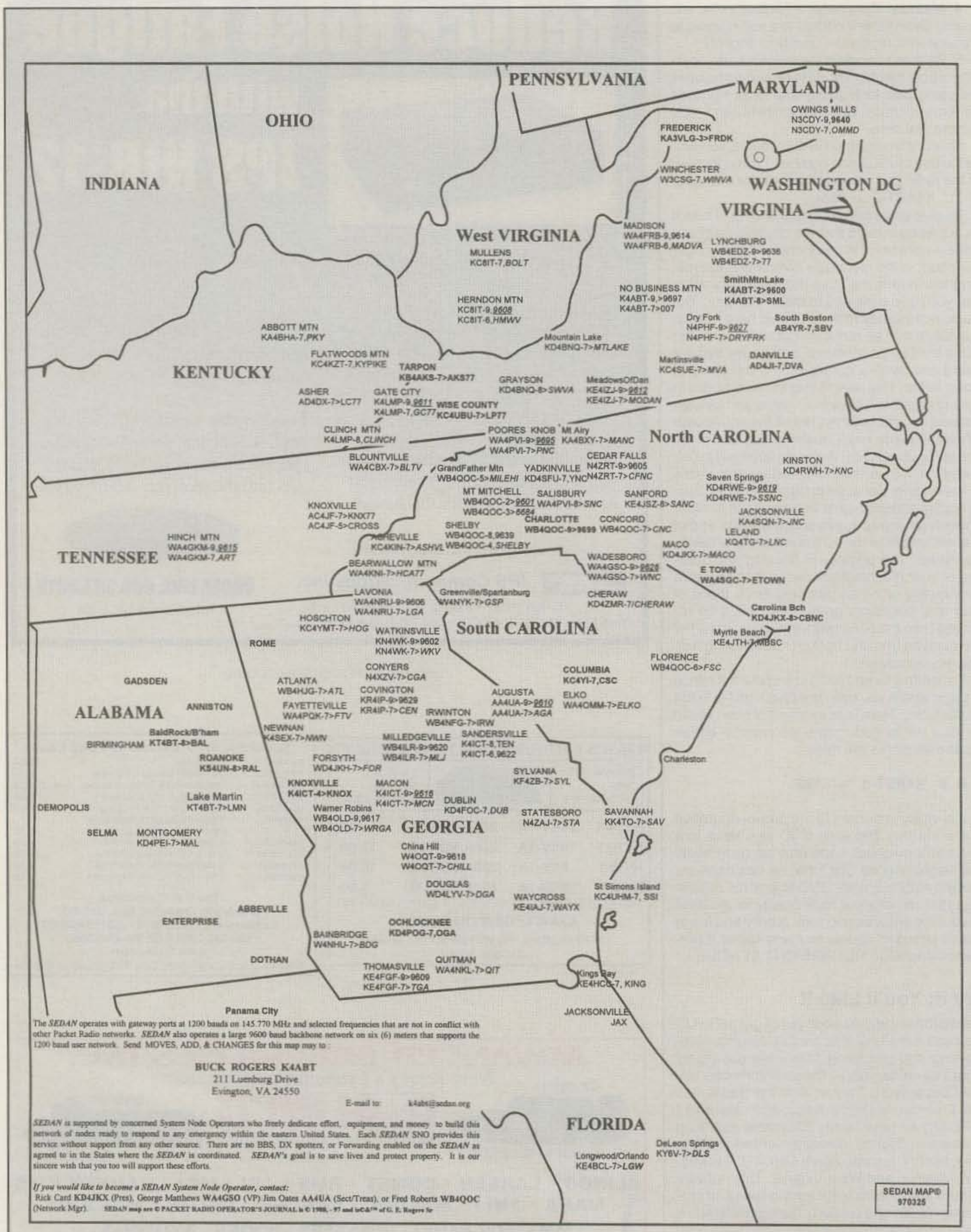

The *SEDAN* operates with gateway ports at 1200 bauds on 145.770 MHz and selected frequencies that are not in conflict with other Packet Radio networks. *SEDAN* also operates a large 9600 baud backbone network on six (6) meters that supports the 1200 baud user network. Send MOVES, ADD, & CHANGES for this map may to :

BUCK ROGERS K4ABT
211 Luenburg Drive
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E-mail to: k4abt@sedan.org

SEDAN is supported by concerned System Node Operators who freely dedicate effort, equipment, and money to build this network of nodes ready to respond to any emergency within the eastern United States. Each *SEDAN* SNO provides this service without support from any other source. There are no BBS, DX spotters, or Forwarding enabled on the *SEDAN* as agreed to in the States where the *SEDAN* is coordinated. *SEDAN*'s goal is to save lives and protect property. It is our sincere wish that you too will support these efforts.

If you would like to become a SEDAN System Node Operator, contact:
Rick Card **KD4JKX** (Pres), George Matthews **WA4GSO** (VP) Jim Oates **AA4UA** (Sect/Treas), or Fred Roberts **WB4QOC** (Network Mgr).

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Fig. 2– The Southeastern Emergency Digital Association Networks (SEDAN) map.

sets of parameters that we use here in the southeast. By "both sets" I mean the parameters that are used on the 1200 baud VHF frequency and the parameters that we apply to the 6 meter, 9600 baud backbone nodes (see figs. 1(A) and 1(B). The different nodes are defined in the map shown in fig. 2. As a rule, the backbone nodes have aliases that begin with the numbers "96" and contain four numbers (for example: 9601 atop mount Mitchell, NC; see the map, fig. 2) in each alias. To date, we have more than 50 of the 9600 baud nodes on the 6 meter backbone.

FYI

I have received many e-mail messages asking about how well the 6 meter backbone works. Without equivocation, I can sincerely state that it works great. As an example, I can connect from my QTH in central Virginia to Nick, WA4GKM's mailbox in central Tennessee (500 miles) in less than 3 seconds. Using the combined 1200 baud and 9600 baud nodes, I QSO with Bruce, WB4OLD, in Warner Robins, Georgia, almost 800 miles away, with a total turnaround of less than 18 seconds. Once the backbone path is complete into central Georgia, this number will drop to around 5 seconds.

The task of building this network has not been easy, and the dedication of the SEDAN SNOs is certainly worthy of every accolade I can present to this concerned group of individuals who donate their time, money, and effort to make this a serious life-saving endeavor.

Glossary of Packet Terms

This month we again continue on with our glossary of packet terms which we began in the March issue. When we finish with the list, it will provide a valuable reference source.

Kantronics: Kantronics designs, manufactures, and markets a range of amateur packet products, including the popular KPC TNCs and KAM multimode controller.

Keyboard-to-Keyboard: Communications between two packet user stations in real time. A fun part of packet radio that is again being experienced by many packet users. Emergency digital communications are but a few ways that keyboard-to-keyboard is useful.

KISS (Keep It Simple and Short): The TNC operating mode where the TNC merely translates packets between half duplex, synchronous HDLC on the radio port and full duplex asynchronous SLIP framing on the host port; the host computer must implement all higher level protocols, including AX25 if it is used. The KISS TNC is only responsible for TX delay and DCD hold-off. Kiss is used with TCP/IP hosts and also often with BPQ and other such PC-based packet switches.

K-Net: A packet networking nodeware EPROM that is installed into the Kantronics KPC-3 and KPC-9612 and enables the station to perform as a network node that closely resembles the X-1J4 node in performance and behavior. The same K-NET node will still maintain all the original features of the KPC-3 or KPC-9612; therefore, the owner does not lose the use of his TNC. Instead the KPC adds another valuable node to an existing node network. The caveat is that the KPC should remain ON around the clock, since the routing will appear in all neighbor nodes of the network. If the KPC is not to be left on the network, the K-Net feature should not be activated.

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Ku Band: Microwave radio frequencies in the region of 10 to 20 gigaHertz, portions of which are used for satellite (notably VSAT) operations at 12 to 14 gigaHertz and local terrestrial "bypass" at 10 and 18 gigaHertz.

LAN (Local Area Network): A LAN is the user access point, be it node, gateway, or cluster. LAN users which are home stations running minimum antenna and power configurations to access the node may access multiple servers through the network via the local access node. An area or locale where a group of packeteers use the same frequency to converse, or receive messages into their personal packet mail box.

LED (Light Emitting Diode): A semiconductor device that emits light under proper electrical conditions. Used both for simple indicators on electronic equipment and (with proper selection and use) as the source of signals for short-range (multimode) fiber-optic transmission systems.

Level: An expression of the relative signal strength at a point in a communications circuit compared to a standard; the standard is most often 1 milliwatt of power at a frequency of 1000 Hertz in a 600 ohm load. The output impedance of most terminal node controllers is 600 ohms.

Link Layer: The logical second layer of the OSI Reference Model for Open Systems Interconnection, located between the Physical and Network layers. Level 2 in the 7 layer OSI computer communications protocol set. AX.25 is the amateur packet level 2 protocol.

Locked Route: TheNET nodes have the capacity to generate routing lists automatically based on parameters set in the node's RAM. The parameters specify default quality values to be assigned to routes to each neighbor, separately defined for radio port neighbors and RS-232 port neighbors. It is possible using the sysop's ROUTE command to manually set a route at a specified quality.

Mail Box: A personal BBS in a TNC. Sometimes also refers to any personal BBS system handling personal mail. (Also called Mail Drop, PMS, Personal BBS, PBBS.) A part of a TNC program that allows messages to be loaded into the TNC and then retrieved from over the air or from the terminal at the TNC.

Mark: One of two possible binary states in data communications. The mark is the resting state in an asynchronous serial system. The negative voltage state on a RS-232 port is called mark. One of the two tones in an AFSK modulation is mark. *(See "space," the opposite state.)*

Matrix: See Diode Matrix.

MFJ Enterprises Inc.: MFJ designs, manufactures, and markets a wide range of amateur packet products such as the popular MFJ-1270C TNC (TAPR TNC-2 clone) used for network construction when installing TheNET X-1J4 and other network protocol EPROM.

MIR: Russian (Soviet) space station the cosmonauts of which regularly use packet radio to communicate with amateurs around the world.

Modem Header: The connector inside a TNC used to connect an external modem to the TNC for higher speed or a different mode of communication. All the data and control lines from the CPU to the modem pass through this connector.

MSYS: An amateur packet BBS software written by WA8BXN. The latest versions also contain DxCluster and conference modes. MSYS has support for TheNET routing and emulates a TheNET node. Note that MSYS's simulation of TheNET is limited by the performance of the PC and may be very poor when the PC is doing BBS operations. The MSYS TheNET emulation features are best utilized as a way to pipe user traffic in and out of the board via the TheNET style node mnemonic.

NACK/NAK: "Negative Acknowledge" character in many data codes; typically used to indicate receipt of a corrupted message, ordering retransmission. Compare to the "REJect" character in packet radio nodes. Negative Acknowledgement, or a packet or AMTOR ACK response that indicates that the data was *not* received correctly.

Neighbor: In a network of nodes the neighbor of a node is any node that is talked to directly, via the RS-232 port, or via the radio port.

NET/ROM: A proprietary product of Software 2000 that implements AX-25 at the link layer (L2), with adhoc protocols at the network (L3) and transport layers. Also provides incoming or outgoing regular AX.25 level 2 connections to internal transport layer connections. Provides automatic routing between NET/ROM nodes, but the user is still responsible for "source routing" between the end NET/ROM nodes and the ultimate source and destination.

Network: Packet radio nodes connected to one another for a defined purpose of packet radio networking. A network is a system of nodes interconnected in such a way that any node can communicate with any other node in the system in an efficient and speedy manner. An example would be a network of user ports wire-linked to backbone nodes that are in turn connected to each other by UHF point-to-point links.

Network Interface: The point of interconnection between one packet radio network and another. In most applications it is called a "Gateway" (e.g., TELNET Gateway between a packet radio network and the Internet).

Node (Network Node): A termination point for packet radio communications links. In the sense of packet radio communications, a node equipped with an X-1J4 EPROM. An active element in a network—this means any connect, from a user station to a bulletin board. A node in packet radio is an intelligent router of real-time data, somewhat more intelligent than a digipeater but faster than a store-and-forward BBS. *(See also TheNET.)*

Node Broadcasts: Each node transmits a message out at quarter- or half-hour intervals, depending on the settings the SNO has installed. This message tells the neighbor nodes what nodes are contained in the nodes table. The neighbor TheNET nodes interpret this information based on the "quality" setting in the node parameters.

Node Stack: Two or more nodes on one site interconnected by a diode matrix.

Obsolescence Count: In a NET/ROM or TheNET system each node entry in the nodes table is given an "initial obsolescence count" each time the route is confirmed by a neighbor's node broadcast. The obsolescence count is reduced at regular intervals. When the obsolescence count reaches a predetermined value, the node entry is considered obsolete and is no longer broadcast to its neighbors.

Summary

That's it for this month. Next month we will continue our glossary of packet terms, plus start out with more information about this great world of packet radio! Until then, don't forget to visit the "Packet User's Notebook" on the world-wide web at <http://www.sedan.org> and you can e-mail me at <k4abt@sedan.org> or at <buck4abt@inmind.com>.

Have Fun Packeting! . . .

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Say You Saw It In CQ

MATH'S NOTES

BY IRWIN MATH, WA2NDM

WHAT'S NEW AND HOW TO USE IT

Food For Thought

As a breather from the long optical communications series that we started this year, this month I would like to impart a couple of ideas and thoughts that I have been harboring for a while.

There was published many years ago a short science fiction story (the name and author of which unfortunately I have forgotten) about space travellers who visited a planet where all civilization had mysteriously disappeared. The few remains of the vanished civilization indicated that the society had developed incredible technology, but something had happened that caused everything to rapidly grind to a halt. When this occurred, all life-supporting industries and functions on the entire planet also stopped, with disastrous results. After a great deal of searching by the visitors it was found that during the several hundred years of the planet's technological development, electronics progressed from simple vacuum-tube-type circuitry, to solid state, then to integrated circuits, to LSI technology, and finally to super-immense scale integration. So complex was this level of integration that engineers were designing systems with entire functional blocks. Basic components such as resistors, capacitors, etc., were not only obsolete and no longer available as individual parts, but were even ignored in the schools, and eventually their primary functions were forgotten. What finally turned out to be the cause of the planet's demise was the failure of a single tiny resistor that no one even knew existed, let alone how to locate and replace it!

While this story was written to exaggerate a point well before the microprocessor, gate array, and programmable logic chips made their appearance, I wonder how much of this scenario will or actually is coming to pass in our own society. Today we commonly design with op-amps, mixers, phase-locked loops, and functional blocks of all types. Some of us (particularly those who are not computer designers) are beginning to learn about and use microprocessors and complex associated software in routine experimentation, and items such as "Basic Stamp" type devices are becoming available through the normal surplus parts dealers. To further complicate things, up until the early 1900s it was possible for a single person to really be an expert in some field, with a total knowledge of that field down to the most basic elements locked in his or her mind. Today, it is no longer possible to be a true expert in any field other than a brand new one. The human brain can no longer contain the "infinite" amount of information that is required, applicable, and/or available in any mature technological field. The Internet, data bases, CD-ROMs, and similar means are necessary to store the vast amount of information that exists, and the so-called expert is the one who knows where to find what is required at the time. Now consider what happens as this type of progress continues to expand. Are we really on the road toward potential disaster 100 years from now?

In the old days when a transmitter or receiver failed, we opened the cabinet and tested the tubes or got out our VTVM and probed until we found the defective part. Then we took our Weller soldering gun, and in a puff of smoke from the rosin core in the 1/16 inch diameter solder, we replaced it and were back in business. But that was then. Have you ever opened your new HT? I have. What I found were three 68-pin chips, a handful of surface-mount components that were unmarked, and some funny-shaped traces on the P/C board (which I happened to know were inductors). Mind you, I needed a magnifying glass to see most of this. Almost nothing looked like the parts from "the old days" with which I was familiar. Keep in mind, however, that's me. At least I know what a resistor or capacitor "used to look like." Younger people certainly do not know, first hand, what the "old days" even offered.

Now I would never dream of implying that technological progress is not good. In fact, I am an avid proponent of progress. That is one of the main reasons why I describe so many new chips and components in this column and encourage experimentation as often as I can and to whoever will listen. I simply am stating that we had better not forget how it all works (at the most basic level), or one day we may be looking for the burned out something-or-another as our life-support systems slowly grind to a halt. That would truly be a shame. I welcome your comments on the above.

Anything Goes?

Because of my avid interest in our hobby, I subscribe to and read just about all of the amateur radio publications available, as well as several of the experimenter-oriented magazines on the market. What I have noticed being advertised for sale lately bothers me. I am talking about the so-called "High Power FM Stereo Broadcasting Stations" that are being offered by some of the mail-order firms that advertise in these magazines. In the interest of discretion I will not mention names at this point, but they are quite easy to find. They often run full-page ads. These firms boast about output power levels of a watt or more, directly in the Commercial FM Broadcast Band at whatever frequency-synthesized point you wish. One manufacturer even states that "an entire Caribbean Island can be covered" by one of his particular models. Mind you, the advertisers also are very careful to state that "sale in the U.S. is illegal" or some other equally lame statement.

Well, I called this particular advertiser and was told that I would have no problem ordering one of their transmitters as long as I "promised" them, verbally on the phone, that I was going to export it and not attempt to use it in the USA. I was also told that they were out of stock temporarily, since there was a great demand for these devices, but not to worry, a new production run would be available in a couple of weeks. If I called back then, they would be glad to accept my order. Simply amazing!

When I first got my ticket at the FCC office in the Federal Building on Washington Street in lower Manhattan (New York City), the FCC was an organization for which one had a great deal of respect (or was it fear?). God forbid if you were even one cycle (we didn't know about Hertz in those days) out of a particular amateur band. We took real pains to keep everything as legal as was humanly and financially possible at the time, and most of us were proud to be amateur radio operators. Now it seems that everything goes—one watt in the FM Broadcast Band, frequency-synthesized, off the shelf, and in stereo yet! But don't think that it ends there. You can also purchase from the same source a 100 milliwatt (output) video transmitter (and others) that operates on one of the commercial UHF TV channels or one of the authorized Cable TV channels (oh, and by the way, if you care, even the amateur bands). Your choice!

When you couple this offering with the "better than one mile" wireless microphone, the "RF Power Booster Amplifier" that amplifies any signal in the 100 kHz to 1000 MHz range to 1 watt, and the descrambler for the CATV coded channels "that is now legal for individuals to own," it makes the early days of working "skip" in the Citizen's Band seem like a joke. At least most people within that band kept within the allocated 23 or 40 channels even though they ran a kilowatt!

I think there is a fundamental problem with all of this. While I do not understand the motivation for producing and selling illegal devices (other than making a quick buck), I am appalled that supposedly responsible magazine publishers allow these advertisements to run. Surely there is enough legal advertising to easily cover the extra couple of dollars that would be lost if these ads were refused. I knew that *CQ* does not accept this kind of advertising and certainly continues to exist, and I am sure the others can as well. All that is accomplished (in the long run) is to undermine any of the housekeeping and semblance of order that has taken so many years to achieve. With the reduction in staff and monitoring facilities of the FCC, it is not far-fetched to envision a day when QRM is commonplace in the world if these practices are allowed to continue and flourish. I would love to know how to legally solve these sorts of problems and welcome your views. If we as responsible citizens do not all adopt some sort of moral set of values, or at least do something, we all are doomed to a future that can easily get out of control with results (mandatory government regulations or worse) that would change our lives in many ways that would not be enjoyable.

Couple this with the "burned out resistor scenario" and we as a society may not make it to the year 2100.

73, Irwin, WA2NDM

c/o CQ magazine

BY DOUG DeMAW, W1FB

DOUG'S DESK

CONSTRUCTION PROJECTS, TECHNIQUES, AND THEORY

Add Digital Readout To Your Analog Gear

Most of us have become conditioned to precise frequency readout by digital-display means. Modern amateur transmitters, receivers, and transceivers are equipped with LCD or LED screens for the presentation of pertinent operating data. Much of today's test equipment is designed to include digital readout of the data. Amateurs have become accustomed to seeing the displayed information extended to the right of the decimal point. No longer are we satisfied with tuning a transmitter to, say, 1919 kHz. We want to have it operate at 1919.00 kHz! Although this desire may be partly psychological, it is good practice to "get on frequency" as accurately as possible.

A substantial amount of older amateur transmitting and receiving equipment remains in daily service, but is equipped with archaic analog readout dials. These dials are not precise enough for many of today's operators. Most home-made amateur gear fits the same description. Likewise for home-built test apparatus.

It is a simple matter to add an outboard digital display unit to most of the older equipment we own. An inexpensive kit is available for this purpose.[1] This article describes the Oak Hills Research DD-1 digital display unit and illustrates how to use it. It may be employed as a direct frequency counter to 50 MHz, or the user can program it to work with nearly any transmitter, receiver, or transceiver.

P.O. Box 250, Luther, MI 49656

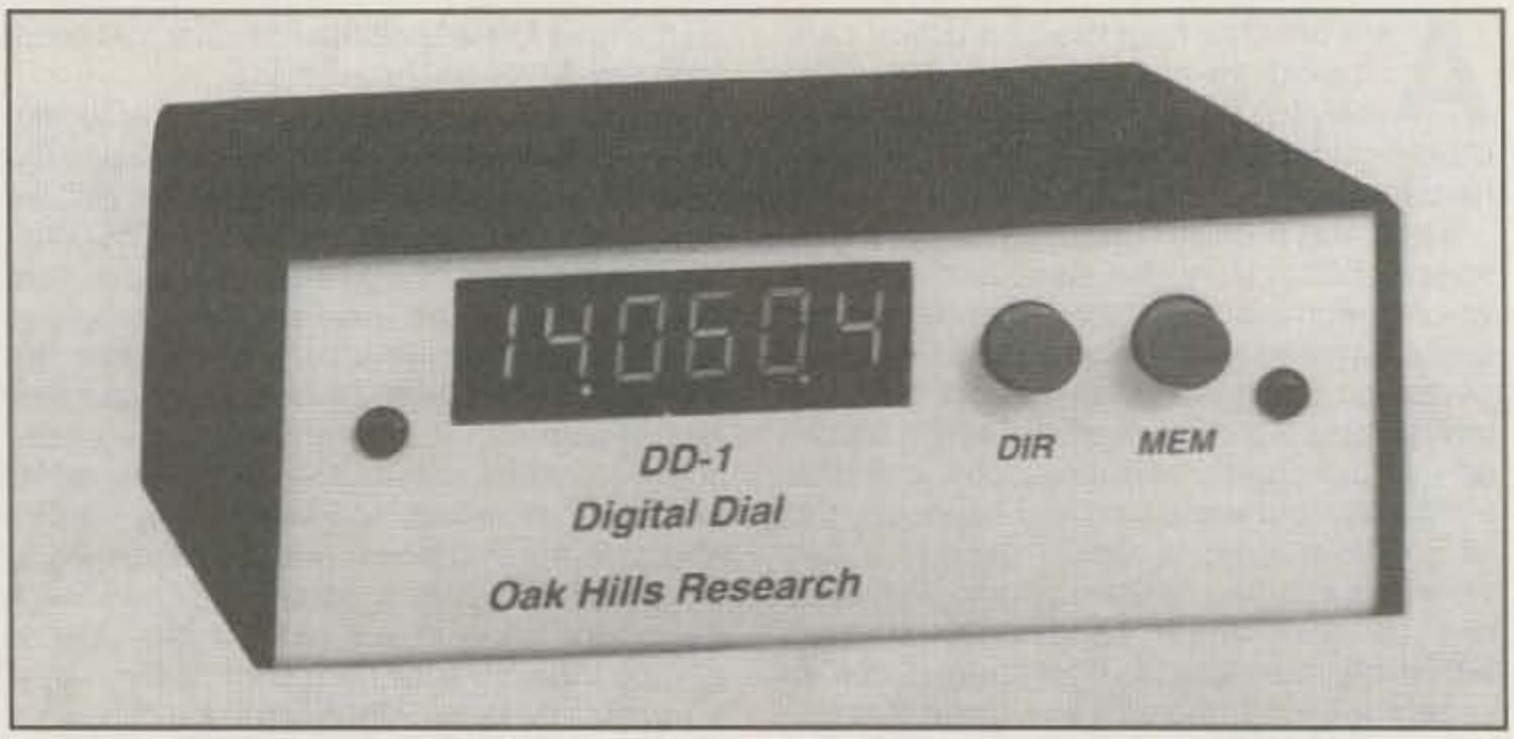


Photo A– The Oak Hills Research DD-1 digital display unit.

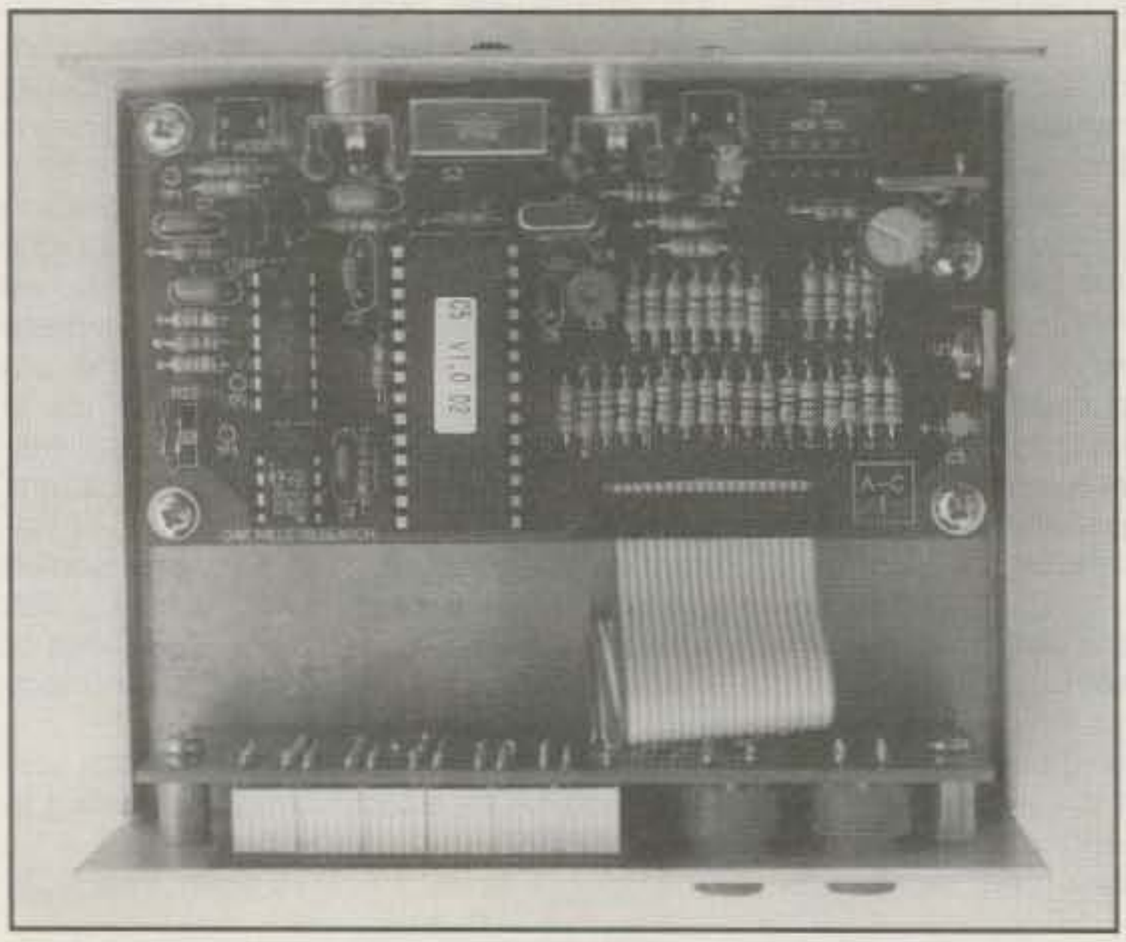
Circuit Details

The DD-1 circuit utilizes two ICs—a 24LC01 (128 × 8) EPROM IC and a 74HC02 quad NOR gate. Data is presented on a 6-digit, red LED display block with 3/8 inch letters. A compound RF preamplifier with a 2N3904 and a 2N3906 boosts the RF input voltage. Frequency resolution is 100 Hz. A decimal point separates MHz from kHz. Another decimal point separates kHz from Hz.

The frequency counter and digital display modules are built on separate PC boards, as shown in photo B. Buttons for memory storage and programming are accessible on the front panel. Two additional programming buttons are located on the rear panel.

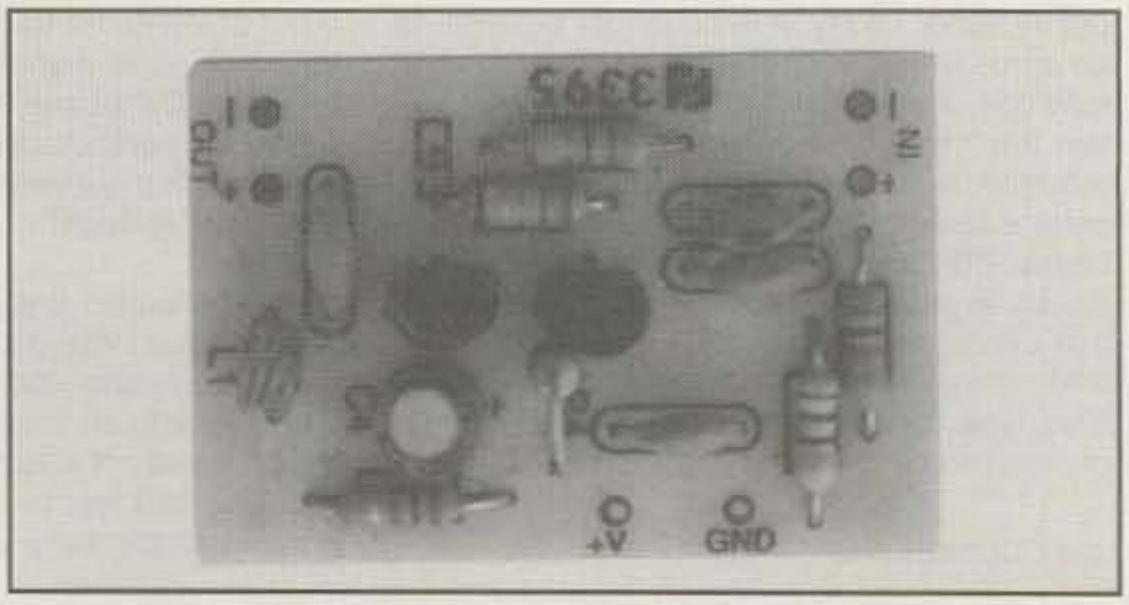
How It Works

The DD-1 requires only one input signal. The VFO in a receiver or transmitter is used to provide the required RF input voltage. The DD-1 circuit enables the user to program the counter for the offset required to provide direct frequency readout. For example, if the VFO operates at 5 MHz, then the unit is programmed to display 14.000.0 MHz or any other chosen HF band frequency. The DD-1 will accommodate both "forward" and "backward" tuning systems, which are dependent



← *Photo B– Interior view of the DD-1 programmable frequency counter. Two circuit boards are used.*

Photo C– The Ramsey 20 dB broadband preamplifier kit after assembly. It is small enough to fit easily into the cabinet of the DD-1 counter. ↓



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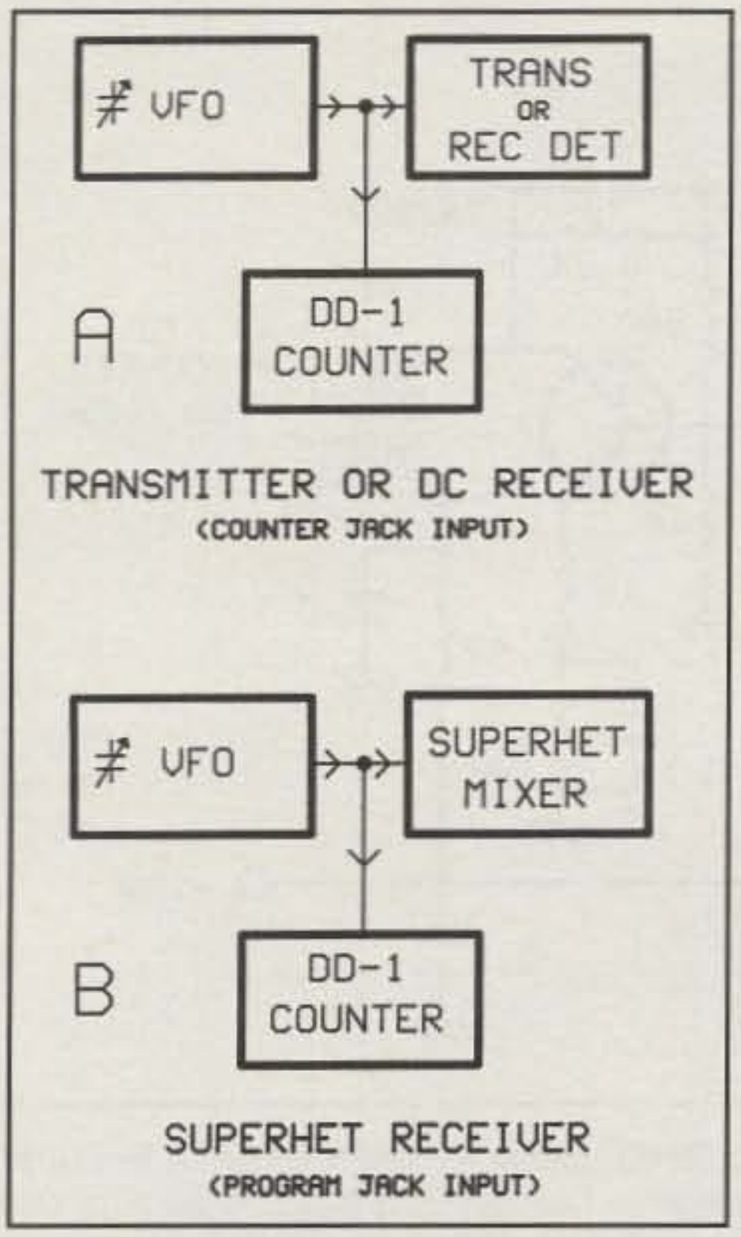

Fig. 1– Block diagrams showing how the DD-1 is connected to a system. Example (A) illustrates the hookup for transmitters, direct-conversion receivers, or direct-conversion trans-receivers. (B) shows the connections for a superhet receiver or heterodyne type of transmitter.

upon the intermediate frequency of the equipment versus the local oscillator frequency. An example of this is when we use a 5 MHz VFO and a 9 MHz IF to utilize the sum and difference frequencies of the mixer to receive the 20 and 80 meter bands. Tuning for one of the bands is backwards from that for the other band.

There are two input jacks at the rear of the unit. One is for direct frequency measurement (standard frequency counter applications) and one for the input signal when using the PROGRAM mode. The frequency counter port has an input impedance of a few thousands of ohms and should require no additional external amplification. The PROGRAM port requires a minimum input level of –11 dBM at 50 ohms. This is equivalent to 0.079 mW of power or 63 mV rms across 50 ohms. An outboard preamp is described here later.

The DD-1 can be programmed for automatic display blanking. This option should appeal to QRP operators who use battery power. Blanking reduces the operating current until the readout is activated.

As many as five offsets can be stored and recalled from the front panel. Therefore, the DD-1 is suitable for use with any rig that uses a different VFO frequency for each band. When using a double-conversion scheme, only one of the offsets is required, because the VFO and IF do not change. Sampling is done at the premixed frequency. Block diagrams that illustrate how the DD-1 may be used with direct-conversion and superhet receivers or transmitters are presented in fig. 1.

The counter IC provides the crystal time base, counter control logic, 6-digit counter logic, multiplexed display driver, and memory control. The time base operates at 4.032 MHz. This places the fundamental frequency and most harmonics outside the amateur bands to eliminate unwanted beat notes.

The counter IC provides 16 channels of data storage. Each program stores frequency offset, normal or inverted counting, continuous display or auto blanking, and 100 Hz or 1 kHz resolution selection. All 16 channels are selectable via the

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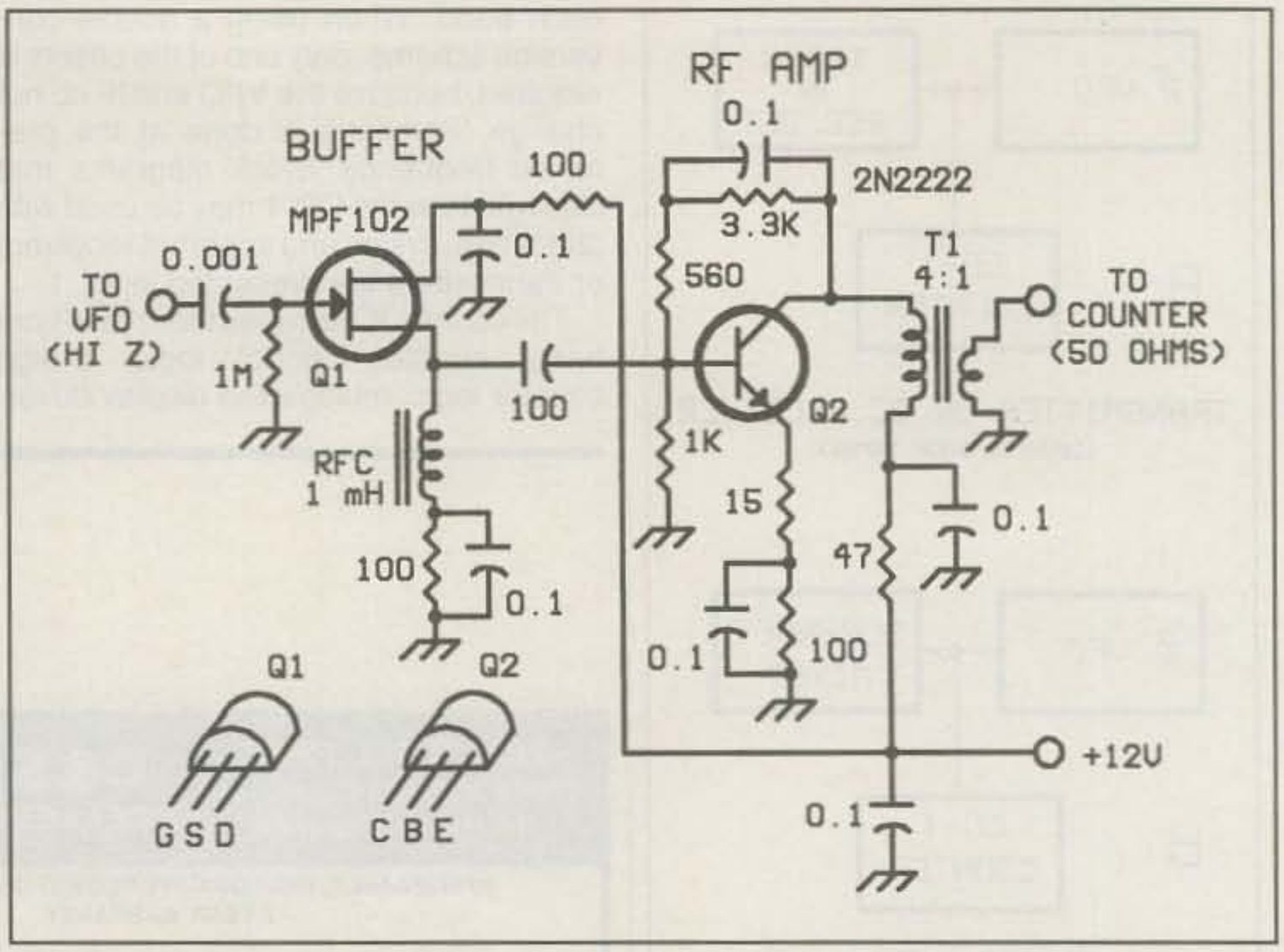

Fig. 2– Schematic diagram of a two-stage buffer/amplifier for use between a VFO and the DD-1 program port to minimize VFO loading. This circuit is suitable also for use in a VFO that is not used with a frequency counter. Capacitors are 50 V disc ceramic. Resistors are 1/4 W carbon or carbon film. RFC is a miniature 1 mH RF choke. T1 has 16 turns of no. 28 enam. wire on an Amidon FT-37-43 ferrite toroid. The secondary winding has 8 turns of no. 28 enam. wire.

MEM SEL terminals that are labeled J3 on the counter board.

The DD-1 may be powered by any well-filtered DC voltage from +9 to +13.6. Most DC wall transformers are suitable if they are rated at 100 mA or greater.

Connection To A VFO

It is important to isolate the DD-1 from the VFO sampling point by means of buffering. This prevents a drop in VFO output power because of loading caused by the 50 ohm PROGRAM port of the counter. Fig. 2 contains a circuit that isolates the DD-1 from the VFO while amplifying the VFO output energy. A JFET (Q1) provides light loading by virtue of the 1 megohm input impedance. Output from Q1 is amplified by Q2, which provides 15 dB of gain and has an output impedance of 50 ohms. A tiny 20 dB broadband amplifier kit that operates from 100 kHz to 1000 MHz is available for those who dread scrounging parts for a project (see photo C).[2] It is the Ramsey Electronics SA-7. This module measures 1" × 1 1/2" and can be installed inside the DD-1 cabinet. The circuit requires 12 volts at 15 mA. The SA-7 is useful for many purposes, such as an instrument amplifier for scopes and frequency counters when working with low-level signal energy. It can be used also as a VHF preamp (noise figure is 4 dB) or FM/TV preamplifier.

Final Remarks

Adding digital readout to home-made equipment not only eliminates the tedium of making and calibrating an analog readout dial, but provides frequency calibration which equals that of commercial gear. Upgrading older rigs with analog dials can be equally rewarding.

I found the DD-1 instruction/assembly manual well written and easy to follow. Assembly and check-out required 5 hours.

Dick Witzke, KE8KL, who operates Oak Hills Research, informed me that his latest model of the DD-1 has a more rugged and easier to wire display board. I had no problems assembling and programming my earlier version of the kit. The DD-1 has a white panel with black lettering. The rugged aluminum case is painted black. Dimensions are 2"H × 4 1/2"W × 4"D.

Notes

1. Oak Hills Research, 20879 Madison Ave., Big Rapids, MI 49307 (phone 616-796-0920). Kit price: $79.95 plus $5.50 s&h. A catalog and QRP kits are also available.

2. Ramsey Electronics, Inc., 793 Canning Pkwy., Victor, NY 14564 (phone 1-800-446-2295 for catalog or orders). Kit price: $14.95. 73, Doug, W1FB

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SGC, Inc. Model SG-231 Automatic Antenna Coupler

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The unit measures 1.8" × 10" × 11.5" and weighs 3 pounds. The SG-231 is waterproof and is designed to be mounted at the antenna feedpoint for maximum efficiency. Retail price is $595. For more information, contact SGC, Inc., P.O. Box 3526, Bellevue, WA 98009 (1-800-259-7331); or your local radio dealer; or circle number 101 on the reader service card.

Powerport 149 Power Supply From Cutting Edge Enterprises

Cutting Edge Enterprises has added The Powerport 149 to their line of rechargeable, portable power supplies. The Powerport 149 is a portable source of AC and DC electricity. It provides 140 watts of 115 VAC (surges to 200 W), and up to 20 amps of 12 VDC power. The Powerport rechargeable power supply is a 12 volt 9 amp-hour, gel-cell battery that measures 4" × 4.5" × 6" and weighs 9 pounds. It can be charged in your vehicle through the cigarette lighter without requiring the engine to be running. It is also equipped with a fully automatic wall charger which can be left plugged in without fear of overcharging your battery. Flexible solar panels are also available as a charging option. The Powerport 149 can be used with handheld radios, test equipment, soldering irons, emergency lighting, laptop computers, handheld GPS receivers, electric hand tools, video cameras, and fax machines.

The units are priced as follows: 140 W, 9 A Powerport $159.95; 140 W, 7 A Powerport $136.95; 50 W Powerport $114.95 (all prices plus shipping). For more information, contact Roger Hall at Cutting Edge Enterprises at 800-206-0115; or write: 1803 Mission St., Suite #546, Santa Cruz, CA 95060; or circle number 102 on the reader service card.

ICOM IC-W32A Compact Dual-Band Handheld

The IC-W32A compact handheld has a total of 200 memories that may be displayed by either frequency or alpha name. Up to eight alphanumeric characters can be programmed for identification on the LCD. Each band has 100 memory channels, and four DTMF memories have up to 16-digit capability. Memory management allows the user to transfer memory contents to either VFO or to other memories while an EEPROM prevents memory loss if the battery runs low. Both VHF and UHF bands can be received simultaneously (both frequencies can be viewed on the display) or

the V/V and U/U functions can be used to receive two frequencies on the same band. The user can transmit on either operating band. The IC-W32A has separate tuning and volume controls for each band on the top panel to allow independent adjustment of each band. The VHF/UHF exchange function can be used to assign VHF/ UHF tuning and volume to either knob. Frequency coverage is 144–148 MHz and 440–450 MHz transmit and 118–174 MHz and 400–470 MHz receive.

A power MOS-FET module provides high power output even under low battery voltage. Three levels of power output are available, including low. The IC-W32A accepts 4.5 to 16 volts external power supply. The unit includes full crossband duplex operation. Scanning functions include programmed, full, and memory skip scan. The IC-W32A also has ten U.S. weather channels. Suggested retail price of the IC-W32A is $479.00. For more information, contact ICOM America, Inc., 2380-116th Ave. N.E., Bellevue, WA 98004 (206-454-8155), or circle number 104 on the reader service card.

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Star brite Liquid Electrical Tape is available in black, red, green, clear, and white. It is packaged in a 1 oz. squeeze tube, 4 fl. oz. can, and 32 fl. oz can. For more information, contact Star brite toll-free at 1-800-327-8583, or write to Star brite, 4041 S.W. 47th Ave., Davie, FL 33314, or circle number 105 on the reader service card.

Ham Gallery From Shack Attack

Shack Attack's new Ham Gallery is a display frame for a personal photo, shack photo, QSL card, XYL photo, etc. Below the 6" × 4" photo/ QSL display area, the frame is personalized with the callsign of the amateur's choice laser-etched in large 1 inch letters. Pictures/ QSLs can be easily changed for a new look. The Ham Gallery is made of a sturdy, clear acrylic which is guaranteed never to yellow. The easel frame design stands anywhere and has a small footprint area to easily fit any size shack. Overall dimensions are 6"W × 5.5"H × 2"D.

For more information, contact Shack Attack, P.O. Box 91, Dept. B, Enterprise, UT 84725-0091; phone 800-573-7388; fax 801-878-2100; e-mail <kb7vrd@aol.com>; internet <www.vcnet.com/sa>; or circle number 107 on the reader service card.

Surplus Sales of Nebraska "Hard-To-Find" Parts Catalog

Surplus Sales of Nebraska has released its latest catalog. Catalog 8 represents over five years of acquiring an inventory of "hard-to-find" parts with the last three years spent arranging them into the catalog. The catalog is 400 pages long with over 5000 photos. In addition to the usual items most parts houses stock, the catalog features Collins parts, vacuum capacitors and relays, high-voltage components, RF related parts from semiconductors to microwave, high-power transmitter parts such as ceramic switches, roller coils, B&W coils, turns counters and shaft couplings, rack cabinets, variacs, power supplies, test equipment, etc.

The catalog is priced at $5.00 in the US and $10 elsewhere. A $5.00 rebate is offered on the first order from the catalog. To order contact Surplus Sales of Nebraska, 1502 Jones St., Omaha, NE 68102; by credit card phone 800-244-4567; fax 402-346-2939; e-mail <grinnell@surplussales.com>.

Oak Bay Technologies BS-25 Automatic Battery Saver

Oak Bay Technologies' BS-25 Automatic Battery Saver module installs between your mobile radio equipment and the vehicle's battery, automatically removing power from the mobile radio or accessory shortly after the ignition switch is turned off. Power to the transceiver or accessory is routed through the BS-25 and is controlled by the ignition/accessory switch in the car. Once the switch is turned on, the BS-25 module internal circuitry takes over and continues to provide power for an additional 4 to 8 minutes, providing the time to end a QSO in progress. It is rated to handle high-current radios, mobile amplifiers, and other accessories up to 25 amps at 14.8 volts. The BS-25 module is housed in a rugged steel cad-plated enclosure for durability and measures 2" × 2" × 1.25". The BS-25 comes with fuse, installation instructions, and a one-year warranty. It is priced at $39.95.

For more information, contact Oak Bay Technologies, Inc., P.O. Box 65494, Port Ludlow, WA 98365; phone 360-437-0718; or visit their web page at <http://members.aol.com/oakbaytec>; or circle number 96 on the reader service card.

Quick Draw Clip System

Quick Draw Clip Systems, Inc. has released their latest member of their Quick Clip System. The design is made from black powder coated spring steel. The clip comes complete with a self-adhesive plastic button to attach to any portable product, two Velcro strips, and an alcohol wipe. It is suitable for carrying a phone, camera, CD player, etc. It is priced at $14.95 plus $3.95 shipping/handling. Quick Draw Clip Systems is also offering a free upgrade policy, where for only the cost of shipping and handling any of their previous Clip Models may be exchanged for the latest model.

For more information, contact Quick Draw Clip Systems, Inc., 4869 McGrath St., Suite 130, Ventura, CA 93003; phone 805-644-6888; toll-free ordering 888-254-7797; fax 805-644-7320; e-mail <ron@clipsystems.com>; web <http://www.clipsystems.com>; or circle number 99 on the reader service card.

Cubex Antenna Company "Mantis" 40 Meter Antennas

Cubex Antenna Company has announced the addition of a new line of 40 meter antennas called the "Mantis." This is the Cubex 40th anniversary antenna and is available in two and three elements and up to seven bands. Prices range from $1199.95 for a 2-element 40 meter antenna on a 15 ft. by 3 in. boom to $2379.95 for a 7 band antenna featuring 4 elements on 10-12-15-17 and 20 meters and 3 elements on 30 and 40 meters.

For more information, contact Cubex Company, 2761 Saturn St., Unit C, Brea, CA 92821 (phone 714-577-9009; fax 714-577-9124), or circle number 100 on the reader service card.

Rainbow Kits Distributed By Milestone Technologies

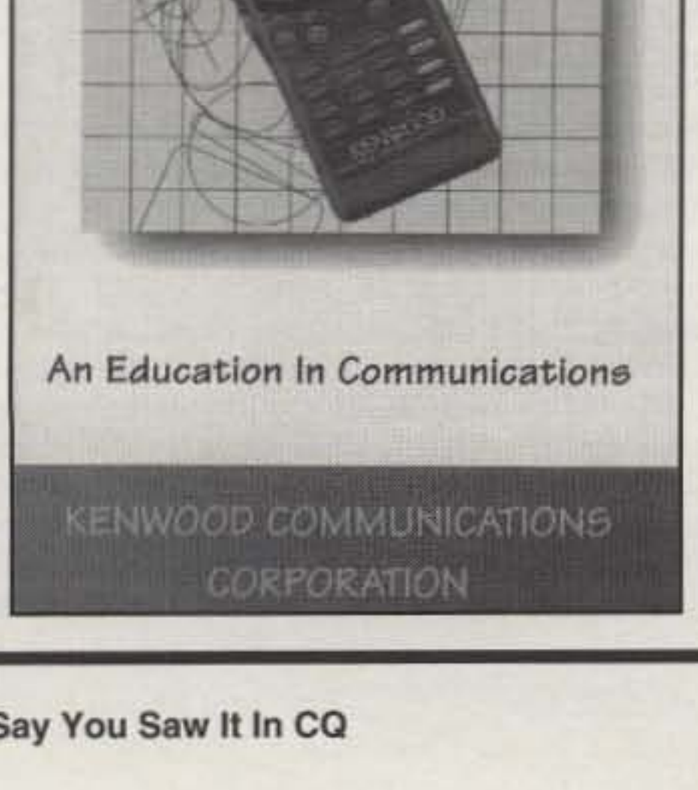
Milestone Technologies is now a distributor of Rainbow Kits from Electronic Rainbow, Inc. Milestone will stock kits that have a direct relationship to amateur radio, as well as some others "just for fun." Examples of the Rainbow Kits are a 5/8/12 VDC voltage monitor, which uses 7 LEDs to indicate voltage in increments of .25, .5 ,or 1 V (VM-1 $7.95); a similar kit for AC line voltage monitoring (VM-110 $10.95); a board kit for a Morse code practice oscillator (OSC-1 $6.95); and a complete Morse code practice kit including oscillator, enclosure, and telegraph key (COD-K1 $24.95). "The Searcher" is a radio direction-finding system which includes a pair of vertical dipoles on a 24 inch boom (SDF-1 $44.95).

For more information, contact Milestone Technologies, 3140 S. Peoria St., Unit K-156, Aurora, CO 80014-3155 (phone 303-752-3382); e-mail on CompuServe (75230, 1405); internet <aa0xi@mtechnologies.com>; web site <http://www.mtechnologies.com/mthome>; or circle number 109 on the reader service card.

New Booklets From Kenwood

Kenwood Communications Corporation has introduced two new tools to help promote the fun hobby of amateur radio. The first is a 25+ page booklet called the "Primer," which was designed as a stand-alone information source about amateur radio. The second is a No-Code Tech study guide system which presents a method of learning about amateur radio. The primer will be available through Kenwood authorized amateur dealers and through hundreds of amateur radio clubs throughout the country. The study guides are available from Kenwood authorized amateur dealers. The "Primer" has a suggested retail price of $2.00, but is available to clubs at a special discount.

The Study Guide package contains one (1) each of: the ARRL No-Code Technician Study Guide; EZ-Pass software (Windows 95 or DOS); "Primer"; a comprehensive full-color amateur band chart; a $10 Gold Seal Certificate redeemable to Kenwood with radio purchase; and an ARRL membership application. For more information, contact your local authorized Kenwood dealer, or Maria Harlan at 310-639-4200; fax 310-537-8235; or e-mail <mharlan @kenwoodusa.com>.



Comet SMA-501 Dualband Antenna From NCG Company

Comet makes several HT antennas designed with an SMA-type connector. Many new generation handhelds use this connector, including the Yaesu FT-50R and the Standard C-508A. Pictured is the FT-50R with the Comet SMA-501 dualband antenna. The antenna is 1.75 inches tall and radiates a 1/4 wave on both 2 meters and 70cm. The Comet SMA-3 is a gain version and is 9.75 inches tall. The SMA-503 is a mid-size antenna, with a very thin, light, and flexible whip 8.5 inches tall. All are now available at most major dealers.

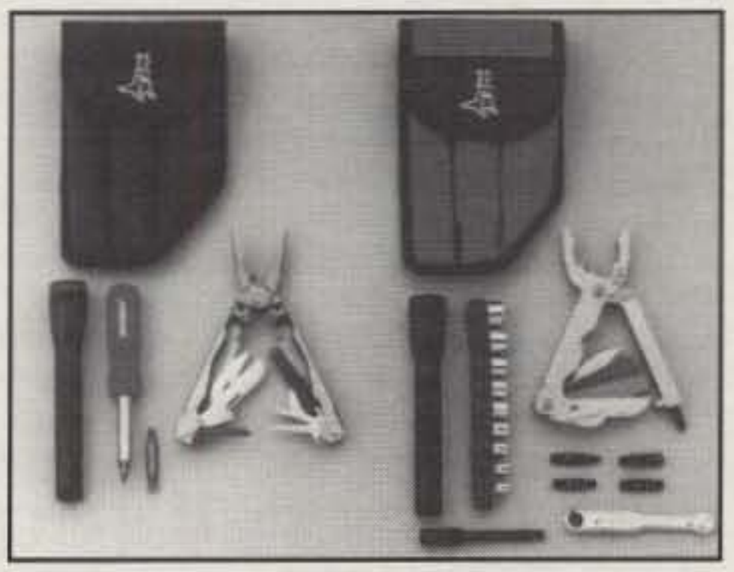
For more information, contact NCG Company, 1275 North Grove St., Anaheim, CA 92806; phone 800-962-2611; visit their web site at <www.cometantenna.com>; or circle number 97 on the reader service card.

Buckmaster HamCall™ CD-ROM

Buckmaster is now offering a new version of HamCall™. It is menu-driven (all information is available through the main menu; menu appears automatically in Windows 95). It features complete U.S. and extensive international listings; over 1,362,000 callsigns, including clubs, military, and RACES listings; over 130,000 cross references from old to new calls; and over 140,000 new and updated listings worldwide. The user can look up U.S. calls by callsign, name, address, city, state, zip, callsign suffix, and county. Data displayed for U.S. amateurs is callsign, class, name, address, license issue date, license expiration date, birth date, previous call, previous class, grid square, county, hours past GMT, area code, e-mail address, beam heading, distance, and now more precise international latitude and longitude, based on city. International data generally includes callsign, name, address, and approximate latitude/longitude. It allows the user to print standard one-up 15/16 inch labels and mailing lists; edit information, such as change addresses, add new records, delete edited records, and add e-mail addresses and phone numbers; and view over 3000 photos of amateurs. Photos/QSLs appear automatically in Windows, and with the press of a button in DOS. Mac users can retrieve by call, name, and zip. It is updated at the end of April and October yearly.

Buckmaster is also offering free inclusion of your photograph/QSL card (any size photo) by sending it along with a permission slip allowing them to use it in their products. All photos will become property of Buckmaster Publishing.

System requirements are IBM or compatible PC, DOS 3.1 or later, CD-ROM drive, 640k RAM. Photo display requires VGA adapter (SVGA highly recommended). It is DOS, Windows, Apple Mac supported. HamCall™ CD-ROM is priced at $50 plus $5 shipping US, $8 shipping international. For more information, contact Buckmaster Publishing, 6196 Jefferson Highway, Mineral, VA 23117; phone 540-894-5777; orders 800-282-5628; fax 540-894-9141; or e-mail <info@buck.com>; or circle number 108 on the reader service card.



Jensen Tools Multi-Tool Kits

The Multi-Tool I Kit starts off with the SOG® Paratool—needle-nose pliers, wire cutter, 3 inch straight point blade, 3 inch serrated sheepfoot blade, 3 flathead screwdrivers, Phillips #1 screwdriver, can/bottle opener, awl, file (fine, coarse edge cut), thumb tab/lanyard hole, and measuring scale. Multi-Tool I Kit also has the Paratool plus a Mini Maglite® and a mini 4-in-1 screwdriver with two slotted/Phillips reversible bits and a blue Cordura® Plus tool pouch with a belt loop.

The Multi-Tool II Kit begins with the Multi-Master™ Tool (with safety lock features)—pliers with cutter, coarse/fine file, serrated sheepfoot blade, saw blade, clip point blade, can/bottle opener, inch/metric ruler, a Mini Maglite, nine 1/4 inch sockets from 3/16 to 1/2 inch, two slotted and two Phillips 1/4 inch hex bits, a 3 inch extension, a 1/4 inch hex to 1/4 inch square adapter, and a 1/4 inch hex mini-ratchet. Adapter, bits, and extension fit into the handle of the MultiMaster. It comes in red Cordura Plus tool pouch with belt loop.

For more information, contact Jensen Tools, Inc., 7815 S. 46th Street, Phoenix, AZ 85044; phone 602-968-6231; fax 602-438-1690; or on the Web at <http://www.jensentools.com>; or circle number 98 on the reader service card.

BY JOE LYNCH, N6CL

VHF PLUS

ALL ABOUT THE WORLD ABOVE HF

The Aurora That Almost Didn't Happen

One evening early last April all of the major television networks' evening news programs reported on a solar flare and how it would cause massive aurora that evening. Unfortunately for these television networks, the predicted aurora did not occur that day. It was the next day and with considerably less fanfare than was predicted. Below are guidelines for auroral communications.

Auroral Communications

If you've spent any time on HF, you're somewhat familiar with the effects of aurora, particularly on 10 meters. Those watery-sounding signals you've heard are signals affected by aurora. However, that's only one small aspect of auroral propagation.

In a February 1985 *QST* article entitled "Radio Aurora," Richard Miller, VE3CIE, stated that aurorae are caused indirectly by solar flares and coronal holes. Either one of these activities can cause particles to be spewed out from the Sun's surface. These particles travel in the solar wind and are caught by the Earth's magnetic fields. The resulting ionization affects the D, E, and F propagation layers of the ionosphere. Whereas the D and F layers are adversely affected, each in different ways, the E layer is affected positively—at least for the VHF+ operator.

When the D layer is saturated by ionization caused by these particles, the HF bands may suffer from "blackout." The higher the ionization of the D layer, the higher the frequency of the blackout.

Across the polar path, the F layer may be adversely affected to the degree that signals sound weak and watery, or may not get through at all. However, the effects of ionization on the F layer may not be all bad, particularly across the equator. Intense ionization of the F layer can create propagation across the equator on the 6 meter band (and possibly the 10 meter band). When equatorial propagation conditions exist, operators, particularly those in the southern states, can work stations in the northern parts of South America.

On the higher VHF+ frequencies, aurora is often observed as a buzz on the signal. To the uninitiated, the sound is that of a transmitter with no filtering in the power supply. However, even that comparison isn't quite accurate because the sound induced by a lack of filtering is often either a 60 or 120 Hz tone superimposed on the signal.

The buzz of the aurora signal is random. This is because the signals are refracted off different surfaces of the aurora oval all at once, causing Doppler shifts in the frequency of the signal. These Doppler shifts are the combination of both the shift in the center frequency and the broadening of the signal.

P.O. Box 73, Oklahoma City, OK 73101
(phone 405-528-6625; fax 405-528-0746)
Internet jlynch@post.cis.smu.edu
Compuserve 72124.2734@compuserv.com

VHF PLUS CALENDAR

June 1	Moderate EME condition
June 5	New Moon
June 6	Highest Moon declination
June 7	*Arietids* predicted peak
June 8	Moderate EME conditions
June 12	First quarter Moon; Moon apogee
June 14–16	ARRL June VHF QSO Party
June 15	Poor EME conditions
June 20	Full Moon; lowest Moon declination
June 21–22	SMIRK 6-Meter Contest
June 22	Very Poor EME conditions
June 25	Moon perigee
June 27	Last quarter Moon
June 28–29	ARRL Field Day Contest
June 29	Moderate EME conditions

**EME conditions courtesy W5LUU.*

Center-frequency shifting can be so severe at times that you'll have to tune your radio to follow it across the band. The flattening of the signal can be so severe that it becomes indistinguishable from noise. In addition, the higher the frequency, the more pronounced these Doppler shifts become. In fact, Harry, K3HZO, and Paul, WA3NZL, found that the Doppler shift on their record-setting 33 cm contact was between –2.5 and –3 kHz.

Because of the buzz, contacts are almost always made on CW because SSB is unintelligible. Occasionally, though, the buzz will disappear and the signals will become clear and loud. This effect is the result of auroral-E propagation. Not much is known about auroral-E except that occasionally, after an auroral event has been in progress for some time, the E layer becomes so ionized that it supports signals much as it would during sporadic-E. Auroral-E is most often observed on 6 meters, but has made appearances on 2 meters. Bill Tynan, W3XO, speculated in his May 1986 *QST* "World Above 50 MHz" column when reporting on the February 8, 1986 aurora, that as intense as the auroral-E propagation was on 2 meters, it might have supported signals on 125 cm.

When Can Auroral Propagation Be Expected?

There are certain times of the day that are best for aurora. The peak time seems to be around 6 PM local time, with a secondary peak sometime around 2 AM. During the year the best times seem to be around the spring and fall equinoxes. Also, look for aurora 27 days after a major event has occurred. If the disturbances have survived the rotation of the Sun, it's possible they may cause another event one rotation later.

For those of you who plot the sun's activities, it's important to note that there's an increase in these disturbances somewhere between two to four years after the peak of the solar cycle.

Because these events are related to the Sun's activities, it's possible to make some general observations. Solar indices are broadcast on radio station WWV at 18 minutes past the hour. Of the three indices, the A-index and the K-index are particularly noteworthy because both indicate relative disturbances on the Sun. In particular, if the K-index is a 6 or higher, there's a strong likelihood that an aurora event will occur. If the K-index is a 9 (as it was twice during the February 8, 1986 aurora, and for an extended period during the March 13–14, 1989 aurora), be sure to get on the air immediately!

Another item to listen for during WWV broadcasts is the announcement of a solar flare and a subsequent proton event. Should this occur, you may be experiencing some excitement on the VHF+ frequencies from between 1 and 2 days later.

How to Work the Aurora

Because you need to bounce your signal off the aurora curtain, you must point your antenna at the curtain. It may be directly north, or it may be off to one side or the other. It's possible to improve your ability to bounce your signal off the curtain by elevating your antenna, so it helps to have an elevation rotator along with the azimuth rotator. Because the aurora curtain is moving constantly, there's no clear way of determining where the best path will be. Therefore, while you're spinning your dial looking for stations to work and tracking them up and down the band, you'll also need to rotate your antenna back and forth and, to a small degree, up and down.

While these techniques will help you work the auroral curtain, they won't work for auroral-E. Should auroral-E propagation appear, you'll find that the paths between you and the distant station become more direct. Although it may take a bit of getting used to, you'll find you can work stations in excess of 1000 miles via aurora propagation on 2 meters through 70 cm, and even farther via auroral-E.

Solar Flares and Sunspot Cycle 23

Following is a bulletin which appeared on the AMSAT bulletin board service, <AMSAT-BB @amsat.org>, concerning the beginnings of sunspot Cycle 23 as it relates to the increase in solar incidents. It was written for AMSAT and appeared on their bulletin board and was relayed to the VHF reflector by Derek, W3KR.

New Solar Cycle 23 Status: It is now becoming quite clear that we have passed old solar Cycle 22 and are ramping slowly upward toward the maximum of the present solar Cycle 23. We have seen some reports and heard speculation regarding this matter that is some-

Say You Saw It In CQ

what inaccurate. Although the official word still isn't out yet, there is an increasingly abundant amount of evidence suggesting that we are now within solar Cycle 23. Some of this evidence follows: Calcium plage emissions are slowly increasing and have been increasing for many months now; the background and daily average x-ray flux values are increasing—they are higher now than they have been since about 1995 when we were still in the decline of Cycle 22; the occurrence of new-cycle sunspot regions is increasing and the frequency of old-cycle sunspot formation is decreasing. This latter item is usually considered the clincher.

Unless sunspot formation suddenly dies out for an extended period of time, the sunspot minimum of solar Cycle 22 will almost certainly be May 1996, where the smoothed sunspot number fell to 8.1.

Prospects for The Future of Solar Cycle 23: Solar Cycle 23 is predicted to be a larger than average solar cycle. Current predictions estimate the sunspot number for Cycle 23 will probably peak near 160 (±30) with a peak in the 10.7 cm solar radio flux near 205 (±30). There is some excitement that this cycle may be a record breaker. The current champion of sunspot cycles is solar Cycle 19, which had a smoothed sunspot number of 201 in November 1957. This is not likely to occur, but it is a notable possibility. The art of predicting the magnitude of sunspot cycles is still rooted primarily in empirical relationships. We do not yet understand the physical processes involved well enough to derive successful quantitative models of sunspot cycles. For this reason, there is a level of uncertainty that (however small) could result in a record-breaking cycle.

If current projections are correct, the sunspot maximum is currently estimated to peak in March of the year 2000. It must be noted, however, that predicting the month of maximum is even less certain than the sunspot number. The actual month of sunspot maximum could be as early as January 1999 or as late as June 2001.

Geomagnetic activity is expected to gradually become increasingly disturbed as we move toward the solar maximum of Cycle 23. The number of days of disturbed conditions is expected to increase from 1997 through to a peak near the year 2002. Thereafter, activity should begin a gradual decline. This is good news for people interested in watching auroral activity, but it is bad news for people reliant on ionospheric radio communications and satellite health. For people reliant on ionospheric radio communications, there is a bitter-sweet story. Although the frequency of degrading interplanetary disturbances will increase, the large increase in ionizing radiation from sunspot regions will provide ever-improving propagation conditions with bands gradually opening into the higher frequencies of the HF bands. The years from 1999 through 2005 will be the worst in terms of geomagnetic and ionospheric disturbances. And of those, the year 2001 is expected to be significantly disturbed, seconded by the year 1999 and the year 2004.

Placing The 7 April Solar Flare Disturbance In Perspective: A few notes and caveats regarding the solar flare and related coronal mass ejection of 7 April are in order, considering how well publicized this event is becoming. We have seen a sufficient number of reports on TV, the Internet, and radio to feel justified in placing this disturbance in perspective. Some sources are blowing this event a fair bit out of proportion.

First, the flare itself was rated a class C6/3N event. The C6 portion identifies the magnitude of the flare in soft x-rays. The flare in x-rays was really not that unusual or spectacular. It was very small compared to the solar flares that we will be observing over the next three to six years. The last portion of the rating ("3N") defines the optical size and brilliance of the flare. In this case, the flare was quite large, but of only average ("N"ormal) brilliance. A size 4 flare is the largest optical flare rated.

So the flare itself was not very spectacular in x-rays, but it was fairly large optically. Since x-rays are considered the more accurate indicator of a flare's true magnitude (and potential influence on the Earth), we can conclude that this flare was really rather diminutive.

Over the next three to six years we can expect to see some solar flares 100 to 1000 times more powerful than this one. This should help bring the ordinary nature of this flare into perspective.

What few people realize is that solar flares themselves are *not* well correlated with the magnitude of interplanetary disturbances (technically called coronal mass ejections or CMEs). Most solar flares don't even produce disturbances that escape the Sun. In fact, a great number of CMEs are not associated with flares at all. And some aren't even associated

VHF Book & Video

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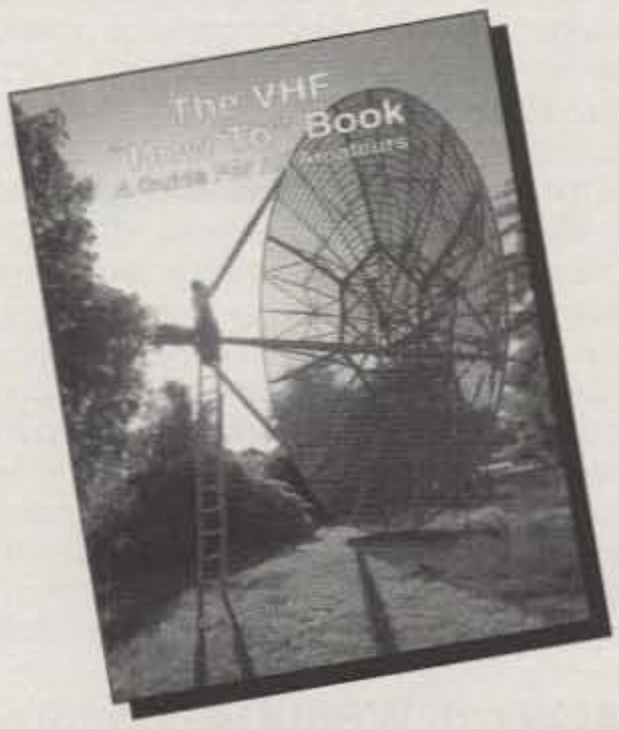

This book is the perfect operating guide for both the new and experienced VHF enthusiast. Developed by CQ VHF Columnist, Joe Lynch, N6CL, this book is the ideal reference tool for all phases of VHF operating. Learn more about packet, EME, satellite, ATV, and repeater operation. You'll also find a complete tutorial on exotic propagation modes as well as pages of data and sources for additional information.

Order No. BVHF $15.95

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with any discernable changes in the appearance of the Sun. Some researchers even argue that solar flares are not related to coronal mass ejections at all, but that they are two separate and distinct types of unrelated phenomena. The jury is still out on that one. Caution must therefore be exercised in relating solar flares with coronal mass ejections.

This particular event does appear to have been related to the C6/3N solar flare of 7 April. The coronal mass ejection itself was larger than most the Solar and Heliospheric Spacecraft (SOHO) has seen, but remember that SOHO has not been in space long enough to see anything but the sparse and less active disturbances associated with solar sunspot minimum conditions. SOHO will undoubtedly see some disturbances over the next several years that will blow the lid off the disturbance currently being publicized. This disturbance is probably being publicized so strongly because of our new and very much improved ability to observe these solar events with new state-of-the-art spacecraft and high resolution.

Placed into perspective, what has really occurred is an event that is not out of the ordinary or liable to produce any serious impacts on Earth. The most probably impact that will be observed is a rather weak shock wave hitting the Earth (marking the disturbances arrival) and producing a sudden (and small) impulse in the Earth's magnetic field, followed a few hours later by somewhat stronger fluctuations in the Earth's magnetic field (perhaps a few of which may be large enough to be classified as "minor" or "major" fluctuations). *[Editor's note: This is precisely what happened, with reports of a few hours of auroral activity on 6 and 2 meters and 135 and, to a much less extent, 70 cm.]* But these too are not out of the ordinary. We routinely see (sometimes several times a month) brief periods of minor and major geomagnetic activity-particularly over the higher latitude regions where such activity is strongest. The geomagnetic activity should coincide with increased levels of auroral activity, but again nothing particularly magnificent is expected. We do not expect auroral activity to become visible from any of the lower latitudes below about 40 to 45 degrees north latitude (over North America). Some locations in New Zealand and (perhaps) extreme southern regions of Australia may observe activity, but this too is not unusual. New Zealand regularly reports sightings of auroral activity, even during the solar minimum. We have received sighting reports from New Zealand observers at least once or twice a month even during the lull of the solar cycle.

Wait until the true power-houses of solar activity start appearing on the Sun. Then you'll see how insignificant this disturbance likely will be. As we rise toward the solar maximum, we will begin to see some periods of geomagnetic and auroral activity that will dwarf this disturbance in comparison. Sightings of auroral activity are usually possible from the southern regions of North America (and sometimes even into the tropics) at least once or twice each solar cycle. Powerful displays visible throughout most of the continental United States, Europe, Russia, Australia, and New Zealand will become much more common over the next three to six years, occurring possibly dozens of times during this new solar cycle.

Over the next several years there undoubtedly will be an increasing number of satellites that suffer anomalies and even failures. The increased sensitivity of satellite components translates (in many cases) to increased vulnerability as well. This should indeed be a very interesting decade of activity and one which satellite owners are likely going to have to sweat through.

Available Tools and Sources of Information: The advent of the world wide web and easy access to the Internet has opened up a wide assortment of possibilities for amateurs and professionals alike. You can now obtain current (almost real-time) images of the Sun and the solar corona. A good source of information is at the WWW page for the Solar Data Analysis Center (SDAC) at <http://umbra.gsfc.nasa.gov>.

Current predictions and other information can be obtained from the Space Environment Center at <http://www.sec.noaa.gov>. Information regarding current solar flux and geomagnetic data can also be found at <http://solar.uleth.ca/solar>. For those nearer to Australia, a great deal of information is available from IPS Radio and Space Services in Australia at <http://www.ips.oz.au>. These are good starting points for finding information on the current state of the Sun.

For those with a hunger for real-time information, a substantial software package is available for those with Windows 95 computer systems (and soon Windows 3.1 systems). It will haul down a huge amount of critical solar and geophysical information in real-time over the Internet. All you need is a computer that can be connected to the Internet (whether via a modem and an Internet Service Provider, or a direct line). The software effectively turns your computer into a solar, geomagnetic, space, and ionospheric "weather" analysis center. The same data is used by professional solar and space weather forecasters. You can observe the progress of solar flares, as they happen, updated on-screen as frequently as you desire (up to once each minute). You can study the current state of the ionosphere; obtain current geomagnetic readings from up to 11 magnetic observatories worldwide; set up to 43 audible warnings providing you with exceptional "activity trapping" capabilities; track the current locations, sizes, and shapes of active solar regions and coronal holes; and much more. We feel it is ideal for anyone who wants to stay on top of current conditions. Details can be found at <http://solar.uleth.ca/solar/www/swarm.html>.

Phase 3-D Launch Delayed Until September 1997

The following is a press release from AMSAT News Service: In a formal announcement from Paris on March 24th, the European Space Agency (ESA) said that the second test flight of their new Ariane 5 booster has now been rescheduled from July to mid-September, 1997. It is this flight, Ariane 502, on which Phase 3-D is currently manifested.

According to their latest announcement, this action was being taken by ESA and CNES (the French Space Agency which manages the Ariane 5 program for ESA) in order to "improve (the booster's) robustness, increase the operational margins, and allow for degraded operating modes."

In a joint statement a day after the ESA announcement, Phase 3-D Project Leader and AMSAT-DL President Dr. Karl Meinzer, DJ4ZC, along with AMSAT-NA President Bill Tynan, W3XO, expressed continuing confidence that ESA and CNES will succeed in completing all the tasks necessary for a successful flight test of Ariane 502. "Naturally, we are disappointed that our launch will not be as soon as we had hoped," said Meinzer. "However, I am pleased that ESA and CNES are taking care to improve the operational margins for the Ariane 5 booster. This action helps give us renewed confidence in the overall probability for a successful launch of our satellite," he said.

Both Meinzer and Tynan emphasized, however, that this launch delay, like the earlier ones, means that the total cost of the Phase 3-D Project will increase significantly. Even before the latest ESA announcement, AMSAT-DL and AMSAT-NA were projecting a combined budget shortfall of about $200,000 (US) in the money needed to complete their respective tasks on the project.

"This shortfall can only increase now as a result of this latest schedule change," said Tynan. Both AMSAT leaders urged everyone to continue doing as much as they possibly can to ensure the needed funds will be in place for the completion and launch of Phase 3-D.

1997 Central States VHF Society Conference

The 1997 Central States VHF Society Conference will be held July 24–26, 1997 at the Clarion Resort On The Lake, Hot Springs, AR. The Clarion Resort On The Lake is surrounded by the Ouachita Mountains and located on Lake Hamilton. The room rate will be $85.00 single/double occupancy. There will be many family programs offered each day also. (Info provided by the society's home page and Joel Harrison, W5ZN, 1997 Conference Host.

Driving and Operating Feedback

Andy Van Deventer, N5NYP, wrote the following in response to my piece about cell phone usage and driving: "I enjoyed your remarks about cell phone users and driving habits in the April CQ. I wonder why people seem to be more focused on a cell phone conversation while driving, yet if they are just talking to another passenger in the car they seem to be able to drive better. There is something at work there—i.e., the passenger may recognize that too much conversation will distract the driver too much when driving conditions are risky and then holds back a bit. Another factor may be that cell phone conversations usually take place for a specific reason requiring more concentration, but a conversation with a passenger will be more relaxed because they just happen to be there. I think mobile amateur radio conversations fall somewhere in between the two distraction thresholds, but sometimes we may be significantly more distracted for brief periods of time than a mobile phone user, such as when trying to tune a radio, etc. 73, Andy, N5NYP."

Al Ward, WB5LUA, Honored At Dayton Hamvention

The following is from Bill Pasternak, WA6ITF, "Newsline On-Line Services": "Congratulations go to Al Ward, WB5LUA, on being selected as recipient of the 1997 Dayton Amateur Radio Associations' Technical Excellence Award. Al

Say You Saw It In CQ

was recognized by DARA for his many contributions to VHF and UHF circuit design and allied technologies that have enhanced operation by all radio amateurs on these higher bands.

New 10 GHz EME Record

The following is from Peter, G3PHO: On Wednesday, 12 March 1997, a new world record for EME on 10 GHz was set in a QSO between Joe DJ7FJ and Greg ZL1GSG. The two-way QSO took place at 08.30 UTC. DF7FJ operated from Schiltach in southwestern Germany and ZL1GSG from Awhitu Peninsula/Manukau Heads southwest of Auckland, New Zealand. The great-circle distance between the QTHs is approximately 18,340 km, or just under 10,000 nautical miles. DF7FJ and his team were using a 4.5 meter parabolic dish and a 50 watt travelling wave tube power amplifier, while ZL1GSG used a 3 meter dish and a similar PA. Reports of "O" were exchanged both ways.

The new world record came after a series of unsuccessful attempts and one semi-successful attempt that saw ZL1GSG using a 1.8 meter dish from Muriwai, on NZ's West Coast northwest of Auckland. Prior to the successful QSO, a test run from Awhitu Peninsula confirmed on the weekend before that moon echoes were clearly audible from the receiver's speaker even a few meters away from ZL1GSG's van. Earlier echoes using the 1.8 meter dish had been very faint. The change to a larger dish had clearly made the difference.

On the night of the QSO, moon echoes were received by ZL1GSG well from about an hour before sked time. A last-minute technical problem, caused by a short in the cable that switched the waveguide TX/RX relay, put the whole project in jeopardy just minutes before the QSO began. However, Greg's policy of having a spare bit of next to everything provided a makeshift solution only a few minutes into the sked window, and contact was established almost immediately after ZL1GSG was QRV again. The signals from Germany were clearly audible as had been the moon echoes.

Congratulations to Greg, ZL1GSG, and Joe, DJ7FJ, from their New Zealand ground support team of the day: Bill, ZL1TTH, Tim, ZL3VTV, and Ulrich, ZL1DDL. Thanks go to many amateurs who helped with the provision of equipment, time, and a QTH.—73, Peter, G3PHO.

Current DXpeditions

CY9AA DXpedition: The following is from Mike Smith, VE9AA. "Hello all you deserving HF/VHF DXers! Just a reminder for those of you who didn't see the CY9AA June/July HF/VHF DXpedition update several weeks ago.

"As of mid April, everything is still a 100% go for CY9AA, June 26 to July 3. We had initially hoped for a slightly earlier date, but there were conflicts with the Coast Guards' agenda for that time period. We'll be active on 160 through 10 meters SSB/CW (usual DX frequencies), 6 meters (50.101 MHz—also with a breakable QSK beacon parked there), 2 meters (144.200 MHz NA and 144.300 MHz EU, just in case), 4 meters receive (70.185 MHz) for 6 meter cross band QSOs. Sorry, but there will be no RTTY, packet, AMTOR, EME, SSTV, or other digital mode QSOs.

"There will be daily updates posted to our UKSMG hosted web site that can be found at <http://www.uksmg.org>. Click on 'CY9' on the left side of the page, just down from the top.

"This is an excellent site, especially for 6 meter lovers. Much info, including maps, recordings, sponsors, pictures, and movies about CY9AA (and also CYØAA last year) can already be found here. Thanks to G3WOS and the UKSMG for making this page for us.

"We will try very hard to accommodate everyone's needs for new band modes. We should make a reasonable presence on the bands thanks to beams and amps on *all* bands, except on 160 meters, where we'll only have a full-size vertical! Don't forget: This will be 'sporadic-E' season in the northern hemisphere. Look for us on 12–6 meters. We were able to work many EU/NA last year from CYØAA with zero F-layer! The team consists of the following: Mike, VE9AA; Doug, VE1PZ; and Dennis, K7BV. We are still seeking donations for this project. You could have your call added to our web page!"—73 de Mike Smith, VE9AA.

Egypt on 6 Meters

The following is from Chris Gare, G3WOS, Chairman, UK Six Metre Group, with the following note: "The UKSMG welcomes the republication of this material, but please ensure that the UK Six Metre Group is referenced together with the address of our web site for further info: <www.uksmg.org/egypt.htm>."

UK Six Metre Group (UKSMG) Press Release, March 20th 1997: Over the last few weeks the UKSMG has been in communication with Ezzat Ramadan, SU1ER, President of the Radio Amateurs Assembly of the Radio Club of Egypt, in Cairo on the basis of encouraging 6 meter activity from Egypt this summer.

The UKSMG has sent Ezzat much material explaining all about 6 meters together with several back issues of "Six News," including a copy that described the 1994 UKSMG DXpedition to Jordan with the callsign JY7SIX. This information has made Ezzat very keen to come on 6 meters in the month of June.

It turns out that Ezzat is already in possession of a Yaesu FT-690 R II, an FL-6020 10 watt amplifier, and a Cushcraft A50-3S Yagi antenna. The group will encourage and/or help Ezzat to obtain a 100 watt amplifier. Ezzat's house is 140 meters above sea level; the building is 25 meters high with a Rohn tower 6 meters in height, so the total height will be 170 meters above sea level or 30 meters above the ground so there should be a good take-off for 6 meters.

Ezzat plans to put the antenna up in the next few weeks, but we should all remember that there is still band one TV activity in Egypt and that there is a 48 MHz TV transmitter northwest of Cairo, so it is not possible to say at this time how much of a problem this will be. We already know how bad it can be from our experience in Jordan in 1994!

The UKSMG will do everything it can to help Ezzat get going on 6 meters, and if successful we can all look forward to working another new country on 6 meters this summer! To Quote Ezzat, " . . . so, SU1ER from EGYPT coming to you this summer. . . . Thanks, dear Chris. Hope you all the best shape . . . 73 be safe, de Ezzat, SU1ER." *(Chris Gare, G3WOS, Chairman, UK Six Metre Group)*

Current Contests

ARRL June VHF QSO Party: The dates for this contest are 14–16 June. Complete rules are in the May issue of *QST*. Note: Your editor

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has received a couple of announcements for DXpeditions and rare grid operations for this contest. These are: Ted, W4VHF; Bill, AA4R; and Gary, K4MQG, will be operating de EM91 during the June Contest and the following week. Their QTH will by South Tybee Beach, south of Savannah, GA. They will be QRV on 6 and 2 meters and 70 cm, with possibilities of 135 cm. Also, George, K9VGE, will be on from EN49, in Canada, on both 6 and 2 meters. For the latest information, check the VHF reflector at <vhf@w6yx.stanford.edu> on the Internet.

SMIRK Contest: The SMIRK QSO Party, sponsored by the Six Meter International Radio Klub, will be held from 0000 UTC June 21 to 2400 UTC June 22 (48 hours). This is a 6 meter operation, and all contacts between the 48 contiguous states must be made above 50.125 MHz. Exchange callsign, SMIRK number, and grid square. No cross-band or partial contacts allowed. Score 2 points for each contact with a SMIRK member and 1 point for each contact with a non-SMIRK member. Your final score is the total number of points multiplied by the total number of grid squares worked.

Certificates will be issued to the high scorer in each state, province, or foreign geographical division. Non-SMIRK members will receive awards if no entry is received from a SMIRK member in their geographical division.

Note: They have deleted the requirement to be a paid-up member to receive an award. The idea is to have a fun contest and encourage everyone to participate and try for an award.

Send a legal-sized SASE for a copy of the log forms. Log requests and logs (postmarked no later than July 15) should be sent to Pat Rose, W5OZI, P.O. Box 393, Junction, TX 76849-0393.

Field Day: ARRL's classic, Field Day, will be held 28–29 June. Complete rules for this contest can also be found in *QST*. In years past tremendous European openings have occurred on 6 meters.

Current Conferences

Ham-Com is scheduled for the same weekend as the ARRL VHF QSO Party. Nevertheless, some of the guys from North Texas Microwave Society will hold their traditional forums during the convention. For more information, contact Ham-Com, Inc., 6208 Preston Road, Dallas, TX 75205-1655, or call 214-522-5003 (fax 214-521-0016). A number of hotels within easy driving distance are priced between $30 (Motel 6) and $110 (Marriott) per night.

Current Meteor Showers

Between 3 and 11 June the *Arietids* Meteor Shower will once again be evident. This is a daytime shower with the peak predicted to occur around 0910 UTC on 7 June. Activity from this shower will be evident for around eight days, centered around the peak. At its peak, you can expect around 60 meteors per hour traveling at a velocity of around 37 km/sec. (23 miles per second).

On 9 June the *Zeta Perseids* is expected to peak. At its maximum, it produces around 40 meteors per hour. On 28 June the *Delta Aquarids S* shower is expected to peak. On 29 June the *Beta Taurids* is expected to peak. Because it is a daytime shower, not much is known about the stream of activity. However, according to the book *Meteors* by Neil Bone, this and the *Arietids* are two of the more active radio showers of the year. Peak activity for this shower seems to favor a north-south path.

As you can see, there are plenty of showers from which to choose.

Silent Keys

Dennis Mungham, VA3SO: The following was written by Peter Shilton, VE3SO: Dennis Mungham, VE3ASO/VA3SO, passed away during the night of March 20/21 in his sleep. At 48 years young (or so), this has happened much too early and only serves to remind us all how fragile life can be.

Dennis's amateur radio career began over 35 years ago, when as a 14/15 year old he began "bootlegging" in the Toronto area. At that time, one *had* to be 15 years old to get a ham ticket. When he was caught by the Canadian equivalent of the FCC, he was given a few days only to qualify for his amateur license or his troubles would escalate. He passed the tests!

The VHFs were Dennis's love from the beginning and he became a well known voice on 2 meters in southern Ontario. From his parent's home in Etobicoke, his 10/10/10/10 el Yagis were a force to be reckoned with. Few could squeeze as many watts from a pair of 4cx250's as Dennis! He spoke often of the 1966 *Leonids* meteor storm and looked forward to their return in 1999.

VHF contesting was Dennis's true passion. He broke record after record for the Ontario Section and Canadian Division as a single op, and was a driving force behind the VE3ONT contest group.

Dennis was, to the best of my knowledge, the only VE to ever win an overall (single-op) top place in a major ARRL VHF contest. That was done in September 1992. It will be along time before that accomplishment is repeated, if ever! It was Dennis, in 1992, who initiated

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contact with the Algonquin Radio Observatory which led to VE3ONT's EME successes on the 150 ft. dish.

It is hard to accept the fact that the familiar "Voice of FN25" will no longer be heard on the bands from 50 MHz to 10 GHz. All of us in the Toronto VHF Society are going to miss him very much.—73, Peter Shilton, VE3AX (ex-VE3VD, VE3EMS).

It was in 1994 at the Dayton VHF Banquet that I was promoting my newly released *VHF "How To" Book*. I had sold copies to practically all of the Canadians who were in attendance—except Dennis. For whatever reason, he seemed to be reluctant to buy one.

After the banquet, prizes were awarded to everyone in attendance. Dennis's prize? A free copy of my book! We all had a great laugh at Dennis's seeming clairvoyance at not buying a copy of the book earlier. I concur with Peter in saying that Dennis will be missed very much.

Roy Brady, W6UXN: The following is from Herb, W3BO: I saw Roy Brady, W6UXN, listed as a silent key in April *QST* and do not recall seeing any mention of it elsewhere. I expect I'm getting a reputation as a guy who does nothing but read the obits, but sonofagun! I see notice of one of the early 50 MHz movers and shakers and it really brings back thoughts. Roy always had a big signal, as befitted a California guy on any band in the late 40s. *CQ* magazine columns are full of his DXploits, Pacific DX, states worked, etc. Maybe the first west-coaster heard in Europe (by G5BY) in late 1947. I haven't gone back through *QST*s of that era. . . . I see a note in "Beyond Line of Sight" listing his contacts with VS6, HL, and Okinawa in December 1982. I know it was often said in the late 1980s as DXCC was becoming a possibility that Roy probably had 'em worked, but wasn't a paper collector. It might be interesting for someone in the LA area to try to get his logs and see just how many he did work! Anyhow, here was a guy who was a DXer before 6 was looked at as a DX band.—73, Herb, W3BO.

Guy Black, W4PSJ: The following is from Steve Harrison, KOØU: N4MM posted a notice on the east coast DX cluster last week saying that he had been informed by another local ham of the passing of Guy Black, W4PSJ. N4MM had met Guy at a local club luncheon the day before where Guy appeared "to be fine." However, Guy apparently died in his sleep in the early morning hours of 10 April 1997. I have not seen further information as yet.

Guy was, at one time, very active from his western Virginia QTH on almost all V/UHF bands through 1296 MHz (and possibly higher). As late as the winter of 1995, he had plans to erect a series of beacons for 903 MHz and up; he had also mentioned eventually trying 1296 MHz EME. Guy provided many with their first FM08 QSO on the higher bands, including myself on 1296 MHz. He will be missed by his many friends.—73, Steve Harrison, KOØU/1.

And Finally . . .

Once again, thank you for your support for this, your column. I haven't always been able to do as much with it as I would like during these past two years. However, I am beginning to see a break in my school schedule. Please continue to let me hear from you about your activities and what you think of my ideas for Internet correspondence. Until next month . . .

73, Joe, N6CL

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BY DAVE INGRAM, K4TWJ

WORLD OF IDEAS

A LOOK AT THE WORLD AROUND US

The Fine Arts: CW and Keys—Part II

Can you handle more key views and Morse tales, friends? Well, kick back, whip out your pocket magnifier, and get set for another round of telegraphic enjoyment. Some heart-warming collectibles are lined up for discussion, but I would like first to share some comments on Morse code.

Understand these occasional keys-related columns neither support nor condone opposing opinions regarding CW requirements for HF privileges. I, personally, enjoy good CW operations, but I do not feel that my interests should be imposed on others—particularly if they are only interested in SSB communications. I do feel, however, true Morse proficiency should be demonstrated before CW operation is authorized, and more conscientiously professional voice operation techniques (plus familiarity with Morse letters) should be required for SSB privileges. That would be a win-win situation for everyone. By clinging to Morse proficiency for all, we are sentencing amateur radio to extinction. Old-timers will pass on, and next generations will look elsewhere for electronic pursuits. Do we wish to stand firm and watch our great hobby become extinct? Moving right along . . .

Some folks interpreted the Coast Guard's recent discontinuance of using Morse code as an indication the mode was becoming outmoded. However, in my opinion, the statement was used to overshadow more serious parts of the story. Setting the record straight, the Coast Guard closed down their continuous watch of HF distress frequencies that had served mariners since 1901, and also ceased Morse operations. In other words, their services were downsized—and dropping Morse buffered the impact. CW is still actively used, however, by all radio/communications operators on ships and at coastal marine stations. The mode is not a primary means of communication like SITOR or FAX, but it continues to be the least expensive and most reliable means of communication by ships of all sizes and origin. In talking with a few marine operations, most say CW comprises 10 to 15 percent of their daily duties. What is the point? The Coast Guard, not the full maritime service, dropped Morse. The mode is still very much alive and well!

Next, I would like to tell you more about the Morse 2000 Outreach program mentioned in last month's column. This is a collaborative effort of the University of Wisconsin's Eau Claire Office of Continuing Education in Human Sciences, the Trace Research and Development Center at UW-Madison, and The John Hopkins University Center for Technology in Education. Should you want to learn more or join their work, contact Debra King, M.Ed. or Thomas King, Ed.D. Associate Professor, 121 HSS Bldg. UW-EC, Eau Claire, WI 54702.

A story in M2000's recent newsletter, "Morsels," presented by Donna McMahan, a pathologist in Kentucky, will knock your socks off. Donna's first research patient was a severely physically impaired and ventilator-dependent lady residing in a long-term care hospital. She was trying to set up a computer and breath-adaptive switch for the patient, but had to drop away from the pursuit for a couple of months. Donna thus left some materials on learning and using Morse code. She returned to find the patient and several hospital staffers had learned Morse code and were communicating by eye blinks. Indeed, a volunteer was translating the patient's eye blinks into printed text at the rate of a page and a half an hour. The patient was eye-blinking poems, articles for the hospital newsletter and prayers for weekly prayer meetings. No one is down and out when they are making such commendable contributions to society! Not only did learning Morse code prove to be the easiest part of the endeavor, it also proved to be more effective than using alphabet charts.

Another patient with only movement of a hand became able to communicate—not just answer yes and no, but use full sen-

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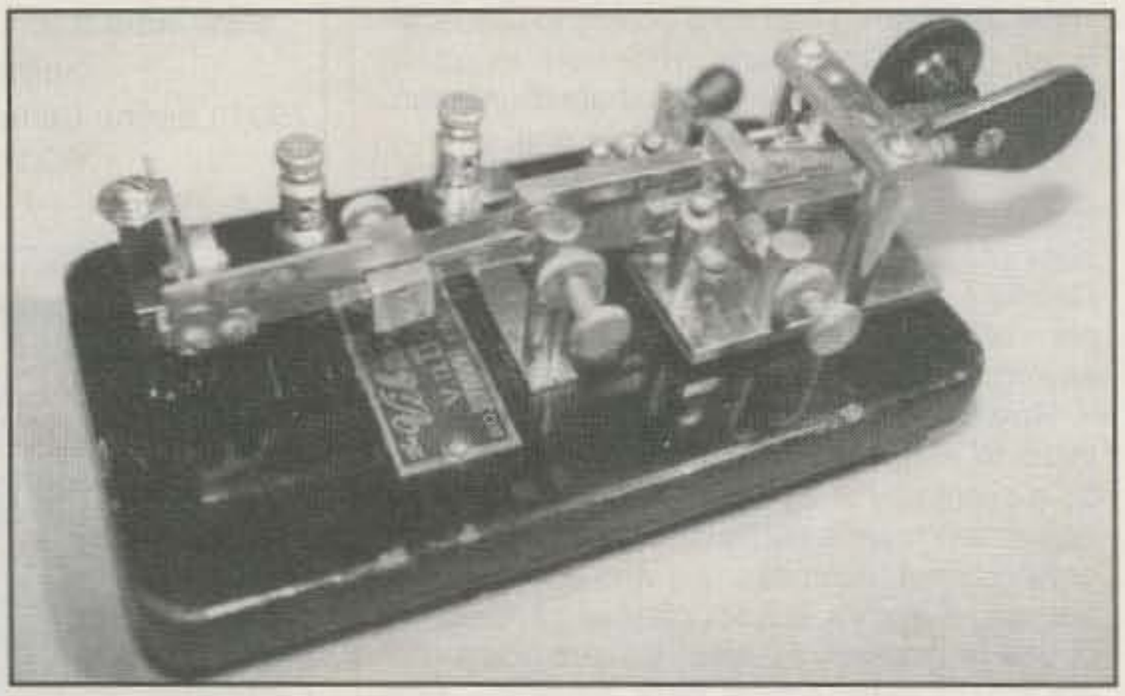

Photo 1– Imitation may be the most sincere form of flattery, but attempting to market a flat-out duplicate of a manufacturer's patent-protected item is definitely a mite extreme! This rare Vibroplex Model X which bears V.D. Liggett's name exemplifies that fact, and it may be the only one left in existence today. (Photo courtesy owner KØJW.)

Photo 2– Close-up view of nameplate on Liggett's illegally produced Vibroplex Model X bug. Talk about tromping on Superman's cape! (Photo via KØJW.)

Say You Saw It In CQ

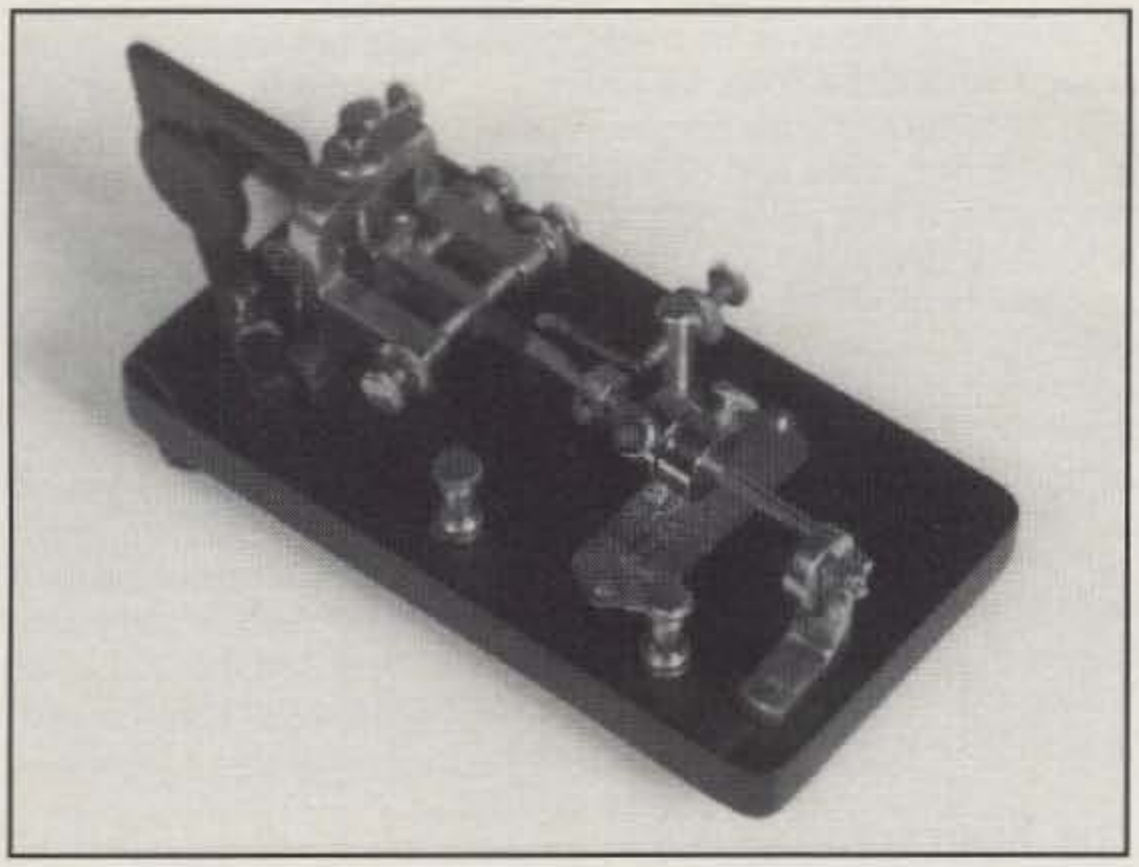

Photo 3– This is a genuine Xograph made by Rolph H. Brown in Toronto, Canada, and it is in pristine condition. Evidently, the original owner never learned Morse code and left it securely boxed for years. New owner N5NXH nabbed the Xograph at a public auction. The goodies are still out there, gang. Keep up that diligent searching!

tences—through hand-squeezed Morse. Yet another patient became communications-capable using a straw with a puff switch for Morse. Donna McMahan relates that in many situations people do not have finances for computerized systems, but anyone who can move something can use Morse code. Our hearty congratulations to Morse 2000 Outreach on their use of Morse to help mankind!

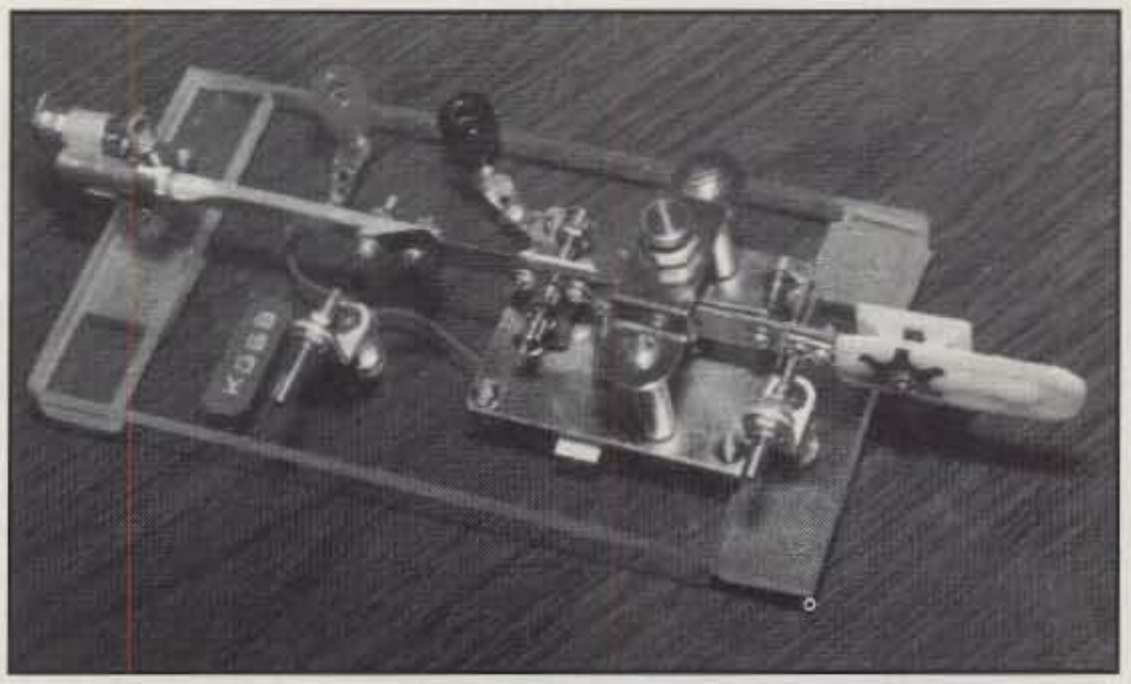

Photo 4– KG5B's one-of-a-kind Junko-Plex. Wacky Wabbler is built on a clear plexiglass base using junkbox parts, screws, and nuts. The feel? Smooth as a half-ton pickup pulling a two-ton load in reverse.

Okay, it's time for the key views. Our commentary put a slight squeeze on space, so savor the photos as we step up the pace.

Liggett's Vibroplex

During the early days of bugs, and as we have discussed in previous columns, some people inaccurately (or blindly!) assumed Vibroplex was a type of key rather than a manufacturer's patented brand. One example was the A to Z Novelty Company, which flat-out copied H.G. Martin's design and was shut down in short order (see my April '95 column). Another less well-known copycat was V. D. Liggett of Tyler, Texas, who very briefly made an exact duplicate of the famous Vibroplex Model X (photos 1 and 2). Indeed, Liggett's illegally produced Vibroplex appears to be made of the very same parts used in the genuine Model X.

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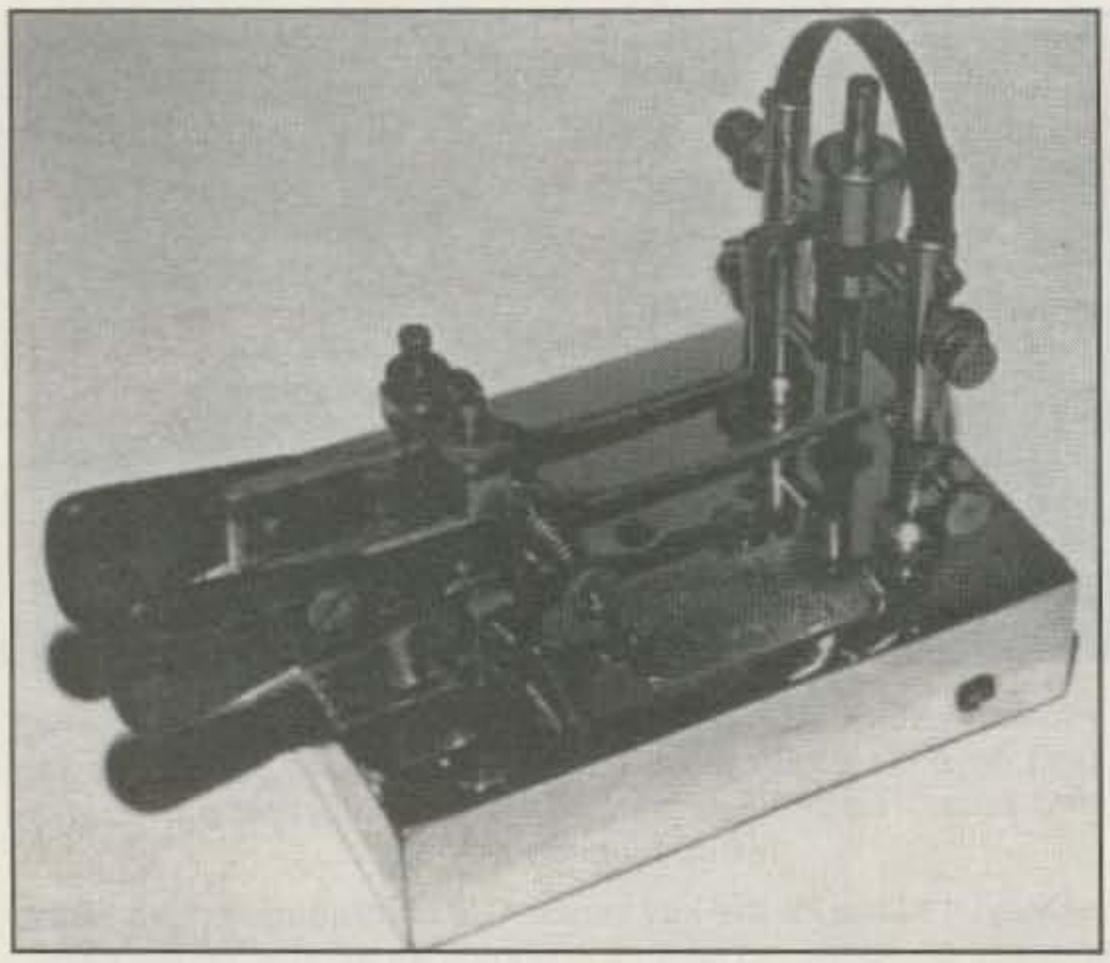

Photo 5– This rare delight is a McDonald Pendograph made in Australia during eras past. It sports dual and independently-operating levers and a bottom-swung rear pendulum, and it works on the principle of relaesing rather than applying pendulum pressure to make dots. (Phot courtesy K9WDY.)

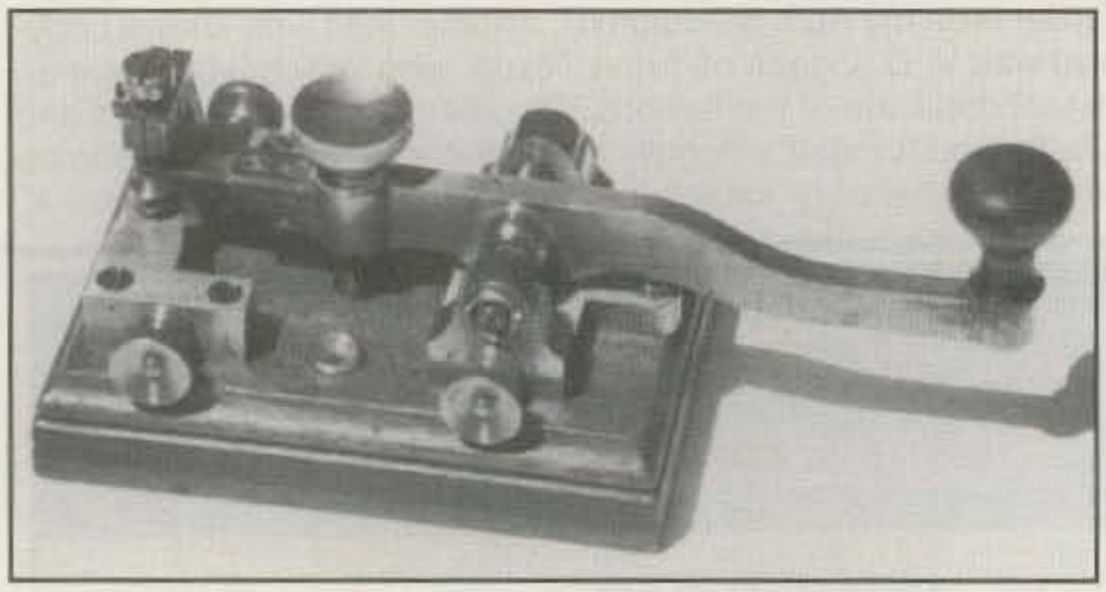

Photo 6– Early version of the world-renown Swedish key. Note the fine bearing work at the fulcrum, knurled knob on tensioning spring, and long, well-balanced arm. The combination produces an exquisite feel. (Photo courtesy owner K6FM.)

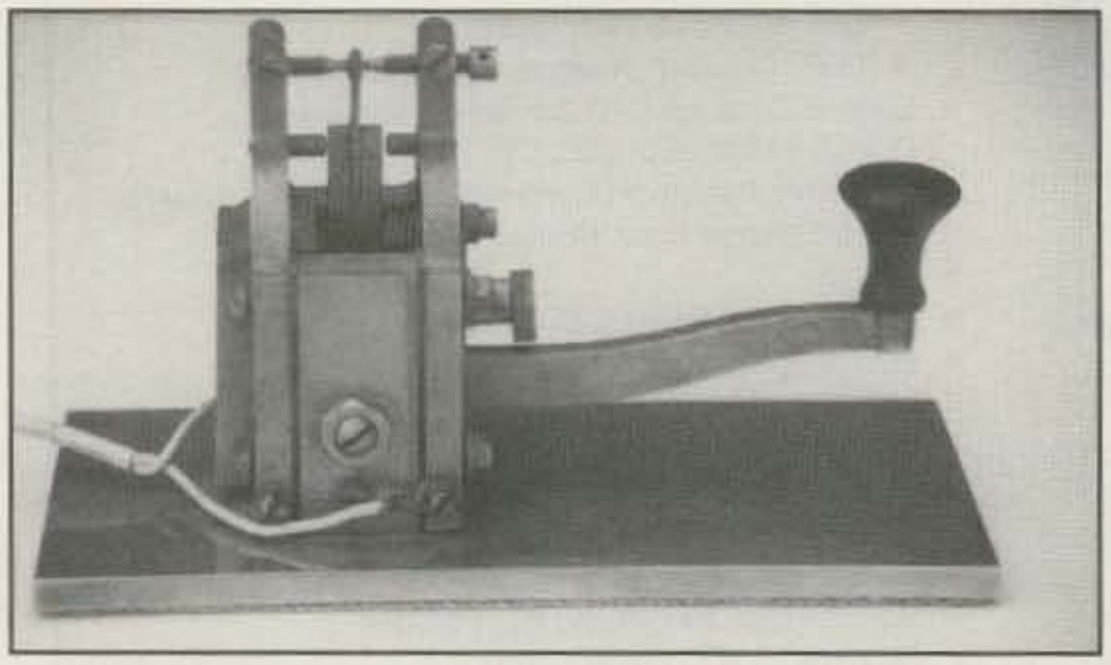

Photo 7– We are not sure how old this right-angle Swedish key may be (we hear it was made when Methusula was a little kid), but it is unique. A quite intricate mechanism is in the enclosure. (Photo courtesy K6FM.)

Evidently no one ever warned Liggett it was not wise to walk on Superman's cape. Yep, he lost!

The Model X is quite unique, as a single set of contacts is used to make both dots and dashes. The main arm is comprised of two sections that pivot in an unusual manner and also produce a reverse-direction movement to make dashes. When the fingerpiece is moved to the right, the arm's lower section and pendulum are allowed to vibrate and make dots, while the arm's upper section moves away from the vibrating contacts. When the fingerpiece is moved to the left, the arm's upper section pushes against the same contact and pushes it against the dot screw's contact to make dashes. The Model X is truly a mechanical marvel, and it is fascinating to watch in action. Liggett picked a terrific key for his nameplate, but the saga did not last long enough to enjoy. The Liggett shown in photos 1 and 2 is the only one known to be in existence. Our special thanks to old friend Steve Wilson, KØJW for sharing the views.

The Xograph

Next up is another interesting semi-automatic key with a somewhat mysterious history—the Xograph shown in photo 3. Charles Tillotson, N5NXH, acquired this beauty at a general auction, and he asks if any of our readers have information on its background. Excerpting some details from its nameplate, the Xograph was manufactured by Rolph H. Brown of Toronto, Canada (no dates known). The key's black enamel base is approximately the size of a Vibroplex Zephyr's (3 by 6 inches), and the dot/dash contact posts are flat on the top. Traditional tensioning springs are not apparent in the photo, and parts are laid out for the dot contactor spring to be mounted in reverse of a Vibroplex. Can any of our readers shed more light on this beauty? If so, drop a note to N5NXH at 4117 W. Weir Rd., Fayetteville, AR 72704.

The Junkoplex

Now there's a name you don't see every day! Even Martin Liggett, Abernathy, Boulter, and A to Z would not squabble over that designation! Seriously, however, the homebrewed critter shown in photo 4 was put together by Cornie Nouel, KG5B. Cornie did not relate the fine details, but he did admit the key was made straight from junkbox-procured parts. Close study reveals a plexiglass base, an arm design similar to a Vibroplex, a hacksaw blade for a mainspring, and, by Jove, that looks like the handle from a metal jeweler's screwdriver for a pendulum. Operating comments? Cornie says it does not feel as good as a Vibroplex, but it actually works!

The McDonald Pendograph

Shifting into the elite category, our spotlight falls on the captivating and quite rare Australian vertical bug shown in photo 5. Intricate details of operation are not immediately discernible, so here is a synopsis.

The rear pendulum is mounted on a rubber washer that allows it to swing from the bottom and insulates it from the base. Moving the left fingerpiece lets the left arm move away from the pendulum and allows it to swing. The U-shaped dot contactor spring mounted below the weight then mates with its contact screw on the bottom of the left canopy support rod. When the left fingerpiece is released, it applies pressure to the pendulum, forcing it against the right support rod's upper screw to half vibration. A rubber washer right below the weight buffers damping action. Killer design! Moving the right fingerpiece lets the right arm contact the right support rod's bottom screw to make dashes. There is no linkage between the arms and no iambic action, so using this bug demands well-coordinated wrist action.

This magnificent mechanical marvel belongs to Gil Schlehman, K9WDY, and it is also one of the special "exotics" featured in my new self-published book, *Keys II: The Emporium*. If you

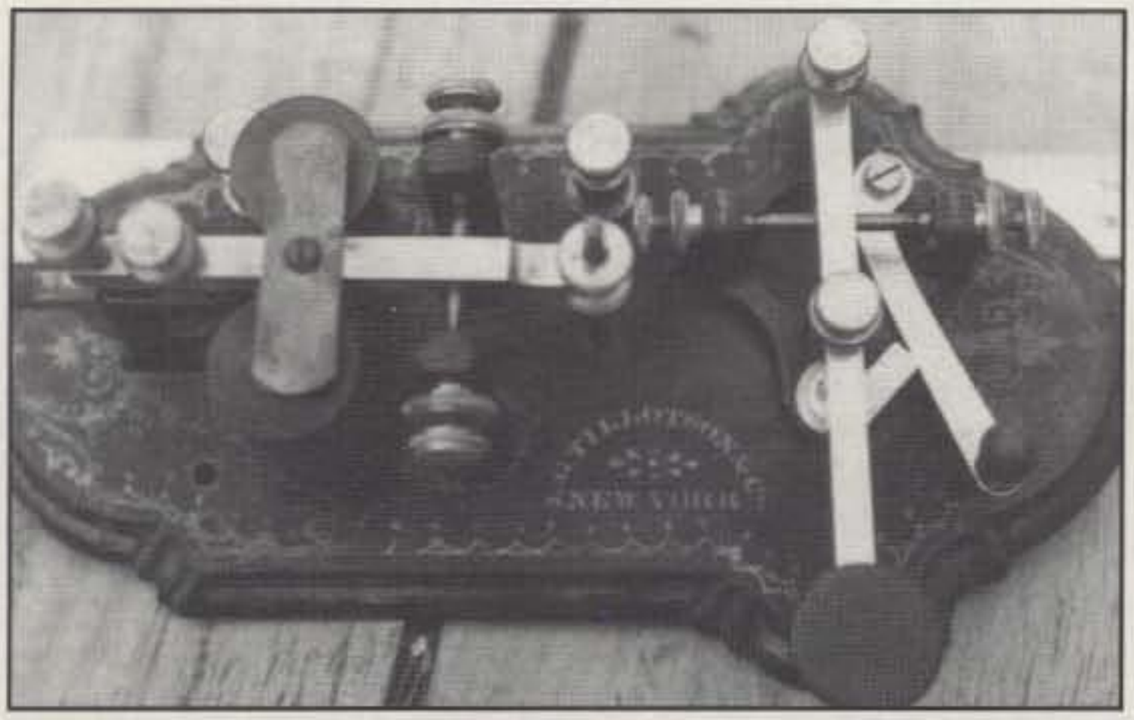

Photo 8– Artistic keys and sounders such as this L. G. Tillotson unit were used in many "uptown" telegraph offices of yesteryear. It is now a genuine collectible. (Photo courtesy N1HBO.)

would like to see more views and read more details of the world's most captivating and unique keys, drop me a note and I will send you a *Keys II* flyer.

K6FM's Prides

From Jan Moller, K6FM, comes views and notes on two early versions of the famous "Swedish key" known by serious telegraphers worldwide (photos 6 and 7). Like watches from the same country, Swedish keys are extremely well-built and smooth-operating items. The first key (photo 5) was made by the General Telephone Company/L.M. Ericsson in Stockholm between 1910 and 1920. It is a heavy piece, with a brass mechanism and base and silver contacts for both make and break fitted to a spring steel insert at the back of the main arm. A mating contact for

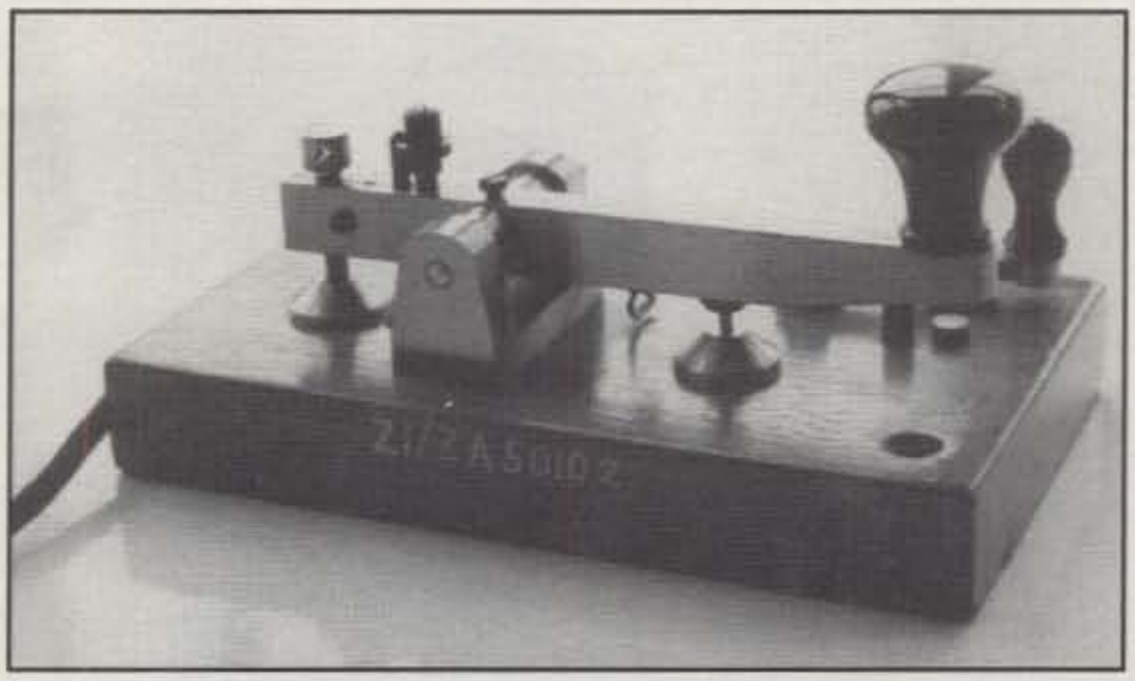

Photo 9– Approximate 20-year-old version of wood and brass British Post office key. Note front and back contacts for use on telegraph lines or radio gear. (Photo courtesy G3XAJ.)

usual keying (make) is in an arm above the steel spring. This style key saw extensive use in fixed landline/telegraph service during the early 1900s, and they were later used in military schools. Jan purchased his key while he was stationed at the Royal Signal Corps in Stockholm before WW II.

The Swedish key in photo 7 was made during the late 1800s. Its arm is angled 90 degrees, so the contacts are on top of the enclosed structure. A counterweight is included on the arm (inside the enclosure) for a smooth feel. The key is quite heavy but still susceptible to "walking," so Jan mounted it on a steel base. He used the key on the air, and says it is comfortable up to 20 words per minute.

Tillotson Key and Sounder

Our next view of telegraphic history is compliments of John

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Photo 10– A British key with Swedish influence? Yes, there it is at the fulcrum and the tension adjustment. This weather-protected gem was made by Price and Edwards in England a few years ago, and some of them may still be floating around waiting to be rescued today. (Photo courtesy G3XAJ.)

Edgerton, N1HBO, and is shown in photo 8. This key and sounder is similar to the ones found in every telegraph office of yesteryear. However, few sported the artistic basework and distinctive pinstriping like this unit. It was made by the L.G. Tillotson Company in New York during the late 19th century. Additional background is unknown, but we thank John for sharing this view of a landline classic.

Beauties From Great Britain

From across the pond and compliments of Richard Hinde, G3XAJ, comes views of two classic British keys (photos 9 and 10). The brass and wood model is quite traditional, with a thick arm supported by an open-frame fulcrum, and a spring pulling down on the arm rather than pushing up on the arm like U.S. keys. A switch on the base's right side is used to select make or break keying. The make contact is mounted nearest to the knob, and the break contact is at the arm's far end. The key is thus suitable for both telegraph line or radio use. It is interesting to note that some of G4ZPY's custom pump keys are similar in traditional British appearance, although Gordon's keys have more exotic bearings.

The key shown in photo 10 was made by Price and Edwards Limited of Middlesex, England and is stamped with a NATO stock number on its removable aluminum cover. These items were made for the Admiralty and were used by the British Royal Navy. Some were also shipped "down under" and used by the Australian Navy. Notice the split-fulcrum design similar to modern Swedish keys and calibrated knob for arm tensioning. A most interesting key, indeed.

WA7QQI's Strap Key

Concluding this month's views is the basic-style strap key owned by Howard Hood, WA7QQI and shown in photo 11. The key may look ridiculously simple and require miniscule explanation, but it inspires a tale of true telegraphic significance. Samuel F. B. Morse was actually a portrait painter, and his first telegraph system used a pen that shifted from left to right to mark dots and dashes on a slow-moving stretch of canvas. Morse's assistant, Edwin Vail, later realized the code could be interpreted by its click-clack sounds, and he devised a sounder. Vail also made Morse's first keys, which he called "Correspondents." Vail's original strap key "Correspondent" is presently on display in the Smithsonian Institute, and Morse's original canvas system is in the Western Union Office in Seattle, Washington. Check them out during your travels.

Wrap Up

You know, friends, there is a special magic in every key. It may be a look, a feel, a special design, a mechanical study, or a tale that needs relating to future generations. The magic may not be immediately apparent, but it is there. Look closely and you will find it, just as I pointed out with WA7QQI's strap key. That is why I enjoy writing these columns on keys and other areas of special interest here in *CQ*. Hopefully, it warms a heart, rekindles an enthusiasm, and/or inspires newcomers to continue our proud legacy. Hopefully, they too will retell our true tales of radio history to future generations.

Stay tuned! There are more special columns coming!

73, Dave, K4TWJ

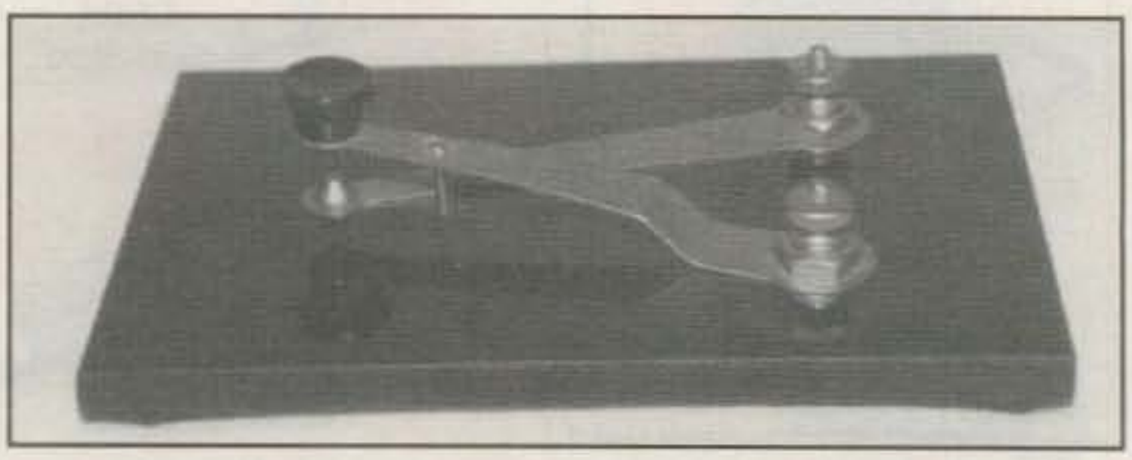

Photo 11– Some people do not pay much attention to a strap key like the one shown here, but each one relates a significant story of telegraphic history. (Photo courtesy WA7QQI.)

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No matter how you look at it, *CQ Contest* is the contester's magazine. We've assembled some of the best contesters in the world to produce a publication that's informative and fun to read. Edited by Bob Cox, K3EST, it offers fascinating articles from fellow contesters OH2MM, N6KT, S50A, I2UIY, W3ZZ, KU2Q, JH4NMT and others!

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BY JOHN DORR, K1AR

CONTEST CALENDAR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Calling CQ Field Day

June's Contest Tip of the Month

Are you struggling with a question about contesting and just don't know where to turn? Most of the contest world's leading contesters (at least the ones I know) are more than willing to share their knowledge. Don't be shy. Apply some elbow grease to your word processor and send a few letters to some of the guys you admire. I guarantee that not only will you be surprised with the rate of responses, but you may even discover a few answers to your questions *before* next year's contest season starts!

CALENDAR OF EVENTS

May	**24-25**	**CQ WW WPX CW Contest**
June	7	Portugal Day Contest
June	7-8	South American CW Contest
June	14-15	All Asian CW DX Contest
June	15	West Virginia QSO Party
June	14-16	ARRL June VHF QSO Party
June	21-22	1997 SMIRK Contest
June	28-29	ARRL Field Day
July	1	RAC Canada Day Contest
July	12-13	IARU HF World Championship
July	19-20	NAQP RTTY Contest
Aug.	2-3	Summer 10-10 SSB Contest
Aug.	2-3	YO DX Contest
Aug.	2-3	ARRL UHF Contest
Aug.	9-10	Maryland-DC QSO Party
Aug.	16-17	New Jersey QSO Party
Sept.	6-7	LZ DX Contest
Sept.	6-7	All Asian SSB DX Contest
Sept.	18-20	YLRL Howdy Days

It's an age-old debate: Is Field Day a contest or just an unofficial "operating" event? The North American Field Day has been around for decades. In fact, the concept is not just limited to the United States and Canada. Countries and regions around the world sponsor field-oriented operating activities as well. Perhaps you can recall listening to 20 meters and hearing a German station calling "CQ Field Day" and signing his call "stroke portable." This style of operating is enjoyed throughout Europe and Australia and within the former Soviet Union—essentially all over the world.

While the ARRL generally has promoted the North American Field Day event as an emergency preparedness event, the fact is that for many, it is indeed a legitimate contest in every sense of the word.

So other than the fact this is the June issue, why the subject of Field Day this month? With declining interest in amateur radio in general and contesting in particular, we have an opportunity staring the contest community right in the face. It's an opportunity that we just can't pass up. Read on.

My own personal start in amateur radio began with Field Day. I was only 12 years old at the time, but even at that young age competition was in my blood. Like many "pre-hams" I enjoyed SWLing—not just to occasionally listen to BBC or Radio Moscow, but to dig for those obscure West African stations on oddball frequencies around the spectrum. For me, it was the beginning of what soon would be an exciting amateur radio experience that has lasted to this day. As an SWL I soon learned that I not only wanted to listen to people, but I wanted to talk to them as well. And, like many potential amateurs today, I really didn't know where to start.

It turned out that my start began with Field Day. Fortunately, my father's office had a very active amateur radio club. While my dad wasn't an amateur operator himself, he had worked with enough of them over the years to learn about this radio event called Field Day, and he knew that his company's amateur radio club would be active.

On a bright, sunny Saturday morning my amateur radio career began to emerge. I remember arriving at the club's Field Day site. There was activity going on everywhere. Some people were busily setting up tents. Others were assembling those strange-looking structures made out of aluminum and U-bolts. I remember wondering what were they going to do with those TV antenna-like projects when they finished building them. To be honest, I was captivated. Not only was this group having fun, but they immediately got my dad and I involved. We didn't know what we were doing, but we did follow instructions well. Little did I know that I was getting the amateur radio bug—a virus that has no known cure for most people.

After several hours of preparation and antenna raising (ah, I finally got the point of those spindle-like TV antennas), tent building, generator starting, cable running, and food cooking, the Field Day city was ready for service. And so was I!

There was one fellow in particular who took an immediate liking to me. Professionally, he worked closely with my Dad and turned out to be the gentleman who eventually would administer my Novice license exam. His name was Julie Fernandez, W2YX. Julie was an Elmer in the classic sense. He knew that he was looking at a future amateur radio operator, and he went out of his way to explain what was going on at the site and get me involved.

As the generators fired up for the first time, Julie sat me down in front of a KWM-2 tuned to 20 meters. We happened to have the beam turned south at that point, and out of the speaker poured a S9+ signal from Peru. My young jaw hit the floor as I marveled at what was happening right in front of my eyes. This was not Radio Peru; this was a real person I could talk to who lived there! And talk we did. It turned out that our Long Island, New York Field Day location was superb, and that KWM-2 transceiver got more action over the weekend than probably ever before.

As the starting gun was about to go off for the 1969 Field Day event, everything was ready at W2DQ/2. Julie sat with me and off he went. He had explained the basic concept of operating to me and instructed me to watch him in action. You could not have blown me off that chair with 20 pounds of dynamite. I was totally captivated. Then one of the most amazing memories of my radio career took place. After operating himself for a few hours, Julie peeled off the headphones and handed the D-104 to me and said, "why don't you give it a try?" That was the closest I have come to experiencing a heart attack. But just like the first time I would later utter the words "Whiskey 2 Papa Victor" or "Willie 3 America United," I jumped at the opportunity. How hard could it be, I wondered. You just say "CQ Field Day, CQ Field Day, Whiskey 2 Dairy Queen, Whiskey 2 Dairy Queen," right? So off I went with the encouraging ears of W2YX right by my side.

My first CQ was relatively uneventful. No one called me. I was almost relieved in a sense, because I don't think I really was quite prepared for a response. My second CQ resulted in a very interesting answer. This was 1969, and we had just come off a recent solar peak (you remember those days; it was when you used to be able to turn on your radio and work DX stations in other parts of the world). After my high-pitched voice finished my CQ (the text was written down on a piece of paper in front of me), I heard, "Japan America 2 Bravo Bravo Echo." I immediately asked Julie, "Is that someone in New York City?" He replied, "It's Japan; call him back!" You then would have needed to upgrade your dynamite order to 40 pounds. I could not believe my ears.

The fact was I was a terrible operator, but I had an insatiable desire to improve. I honestly believe that even after that brief 24-hour experience, I was better than when I started. That's how operating and learning work: practice, practice, practice. After my adventure in the "field" there was nothing I wanted to do more.

There were many other stories of new amateur radio experiences that weekend for me. On Monday morning I was on a path to hamdom. The study guides were on order, the Ameco code practice oscillator was being shipped, and W1AW's code practice frequencies were proudly displayed at my SWL listening position at home. An amateur and future contester was born.

So what's the point, you ask? I didn't want to bore you with the K1AR life history lesson this month as much as I did want to grab an opportunity that's staring us in the face this month. Whether you agree that Field Day is a

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Compuserve ID: 71301,424

contest or not is not the point. Just as there was a 12-year old youngster in 1969 who became infatuated with amateur radio as a result of his Field Day experience, so is there one in 1997. The dynamics are the same. Frankly, it's too easy to assume that the Internet has "completely" taken over the minds of any future amateur radio participants. If that's the case, we'd better invest our hard-earned income in other activities, because the bands will become quiet very, very soon. The reality is, however, that events such as Field Day are perfect for amateur radio recruiting. I've seen it at virtually every Field Day event I've ever attended.

I understand that some of you are designing Field Day plans with the competitive spirit in mind. I've been involved with them, too. Imagine a 15-transmitter affair, all running KWs with 7 or 8 towers, including a 4/4 20 meter array at 80+ feet. This W2RQ operating team, led by the amazing project coordination of N2NT, pulled off that trick two years in a row! If you're more normal (and I encourage you to head in that direction!), think about my experience over the next few weeks. If it worked for me 28 years ago, it can work for others today. That's how new amateur operators are born.

Final Comments

Many of you have asked for more profiles of other and their stations in future issues of *CQ*. I agree, so be on the lookout for this feature to return on occasion.

As always, please remember to provide any submissions for the September "Contest Calendar" to me by July 1st.

73, John, K1AR

Portugal Day Contest

0000–2400Z Sat., June 7

This is the seventh running of the Portugal Day Contest sponsored by Rede dos Emissores Portugueses. It is on SSB only on 80–10 meters (no WARC bands) with recommended operation limited to IARU Region 1 band plan.

Classes: Single Operator, All Band, SSB.

Exchange: Portuguese stations send signal report and their District/Region. All others use signal report and sequential number.

Scoring: QSOs with non-Portuguese stations are worth 3 points. Contacts with Portuguese stations are worth 6 points. You may QSO the same station on different bands.

Multipliers: You may take multiplier credit for each Portuguese District and DXCC country you work. Contacts within your own DXCC country only count for multiplier credit. Final score is total QSO points from all bands times the sum of all multipliers.

Awards: Plaques will be awarded to the top five world-high scorers. Certificates are also available, including a participation award to any station working 25 or more Portuguese and/or EA stations.

Logs must be postmarked no later than July 31st and should be sent to: REP Award/Contest Manager, P.O. Box 2483, 1112 Lisboa Codex, Portugal.

World-Wide South American CW Contest

1200–1800Z Sat. to Sun., June 7–8

First run in 1982, the WWSA CW Contest is sponsored by *Antenna-Electronica Popular* magazine. It is a superb opportunity to work valuable stations, prefixes, and countries for many international CW awards.

Classes: Single Op/All band or Single Band, Multi-Single, and QRP.

Exchange: RST and continent.

Scoring: Stations may be worked once per band (80–10 meters). *For S.A. stations:* Credit 2 points for all QSOs with other SA stations (including same country). QSOs with other continents are worth 10 points. Credit 2 multipliers for each prefix worked with other stations.

For non-S.A. stations: Credit 10 points for S.A. QSOs and 2 points for all others. Credit 2 multipliers for each S.A. prefix worked. Band score is determined by multiplying total QSO points times multiplier. Final score is the sum of all valid band scores.

Logs must be received no later than October 30th and should be sent to: WWSA Contest Committee, P.O. Box 282, Rio de Janeiro, RJ, Brazil 20001-970.

ARRL VHF Contest

1800–0300Z Sat. to Mon., June 14–16

Action will be found on the 50, 144, 220, and 420 MHz bands, and

even higher up in the spectrum.

The scoring varies with the different bands used, and there are certain requirements and restrictions in the rules. Complete rules can be found on the ARRL web site at <www.arrl.org>.

I recommend that you write to ARRL Headquarters for official forms or download them off their web site. Include an SASE with your request to: ARRL VHF Contest, 225 Main Street, Newington, CT 06111.

All Asian DX Contest

CW: June 14–15 Phone: Sept. 6–7
0000Z Sat., to 2400Z Sun.

This is the 38th year of this activity sponsored by the JARL. Rules were not received as of the time of this announcement in *CQ*, so I'm running last year's info. The exchange is between Asian countries and the rest of the world.

Classes: Single Operator, Single- and Multi-Band. Multi-Operator, Single- and Multi-transmitter, All Band only (one signal per band only).

Club stations are classified as multi-operator and each operator must give his age in the exchange.

Exchange: For OMs-RS(T) plus age of operator. For YLs-RS(T) and 00.

Scoring: 3 points for contacts on 160; 2 points for contacts on 80; 1 point on all other bands.

Multiplier: Asians credit one multiplier for each different DXCC country worked per band. Non-Asians use the number of Asian prefixes worked on each band (CQ WPX list).

Final Score: Total QSO points from all bands times the total number of multipliers worked.

Note: JD1 stations on Ogasawara are in Asia, and JD1 stations on Minamitori Shima are in Oceania.

Awards: Certificates to the top scorers, both phone and CW, in each country and U.S. call area. Also in each class, both single band and all band, up to the fifth rank, depending on the number of log returns. Medals will be awarded to the all-band continental leaders both single and multi-operator.

Logs: Keep all times in GMT. Use a separate column for the country or prefix multiplier, and fill it in only the first time it is worked. Use a separate log for each band. Include a summary sheet showing the scoring and other information, and a signed declaration that all rules and regulations have been observed.

There is a strict disqualification clause for taking credit for duplicate contacts in excess of 2% of the total on each band, as well as other infractions.

Logs must be received no later than Sept. 30th for the Phone section, and July 30th for CW. They go to: JARL, Contest Committee, P.O. Box 377, Tokyo Central, Japan.

Asian Country List: A4, A5, A6, A7, A9, AP, BV, BY, CR9, EP, HL/HM, HS, HZ/7Z, JA–JS, JD1, JT, JY, OD, S2, TA, all C.I.S. DXCC countries, VS6/VR2, VU, VU4, VU7, XU, XV/3W,

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West Virginia QSO Party

1800Z to 2400Z Sun., June 15

Sponsored by the West Virginia State Amateur Radio Council, you're invited to take part in celebrating the birthday of the United States' 35th state, which joined the Union on June 20, 1863. Stations may be worked once per band/mode. No repeater QSOs are permitted.

Exchange: WV stations exchange signal report and county; all others send signal report and state/province/DXCC country.

Frequencies: CW—1810 and 35 kHz above the lower band edge; Phone—1860, 3860, 7260, 14260, 21360, 28360 kHz; Novices use 25 kHz above the lower Novice band edge.

Scoring: Score one point for phone QSOs and two point for CW contacts. Credit 25 bonus points (one time only) for working W8WVA, the official WV ARC station. Final score is QSO points time total WV counties worked. Add bonus points after all other calculations.

Logs entries with summary sheet are due by July 15th and should be sent to: WVQP, Dave Ellis, WA8WV, 610 Hillsdale Drive, Charleston, WV 25302. Include an SASE for results. You may also submit your entry via the Internet (ASCII format only) to <WA8WV@aol.com>. Receipt of log will be acknowledged.

SMIRK Contest

70000–2400Z Sat., to Sun., June 21–22

This one is sponsored by the Six Meter International Radio Klub and is designed to promote 6 meter activity around the world.

Exchange: Callsign, SMIRK number (if appropriate), and grid square.

Scoring: Regular—2 points for each contact with a SMIRK member and one point for others. Enhanced—Double your QSO points for all QSOs between USA and Canada if made above 50,200 MHz. You can not work a station twice. Final score is total QSO points times total number of grid squares worked.

Awards are available for all high scorers. Send logs no later than July 15th to: Pat Rose, W5OZI, P.O. Box 393, Junction, TX 76849-0393.

ARRL Field Day

1800–2100 Sat. to Sun., June 28–29

Without a doubt, this activity generates more stateside participation in manpower than any other amateur radio activity. It is mostly a club-organized event, and requires that the coordinator be knowledgeable about all the various operating/technical requirements.

Entries are separated into many classes. Rules and requirements are quite extensive and will be found on the ARRL's web site at <www.arrl.org>. It is advisable that you read them thoroughly.

In the absence of computer logging, official log forms are a must. Direct your request with a large SASE to the ARRL, ARRL Field Day, 225 Main Street, Newington, CT 06111.

Canada Day Contest

0000–2359Z, Sat., July 1

Each year on July 1st, the anniversary of Canada's confederation, the Radio Amateurs of Canada sponsor the Canada Day Contest. Amateurs from around the world are invited to Canada's birthday party on the air.

Classes: Single Operator—All Band (high power, 100W and QRP), Single Band, and Multi-Operator.

Exchange: Canadians sent RS(T) and province/territory. Foreign entries send RS(T) and serial number beginning with 001.

Points: Any station may work any other station for credit. A QSO with a Canadian station is worth 10 points. Canadian stations with an RAC, VCA, or QST suffix are worth 20 points. Stations outside of Canada are worth 2 points.

Multipliers: Credit 1 multiplier per band and mode worked for Canadian provinces and territories (12 maximum). Final score is total QSO points times your multiplier.

Awards: There are a number of plaques available, including the Jorge Bozzo, LU8DQ, award donated by Alan Goodacre, VE3HX, for the highest non-Canadian score. Certificates will be sent to category winners around the world as well.

Entries must submit a summary sheet showing score calculation as well as a dupe sheet, multiplier checklist, and logs. Send entries to: RAC, 720 Belfast Rd., #217, Ottawa, ON K1G 0Z5, Canada by July 31st. Results will be published in the November issue of the Canadian *TCA Journal* (contact RAC for further information) and will be sent to all certificate winners.

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1996 CQ WW DX CW Contest High-Claimed Scores

The following are raw scores only and are subject to verification.

WORLD SINGLE OPERATOR ALL BAND

P40W	13,234,998
HC8N	11,762,724
9Y4H	11,468,370
8P9Z	8,774,040
TI1C	7,645,448
4V2A	7,564,694
8R1K	6,277,335
3E1DX	6,265,281
GIØKOW	6,197,970
A71CW	6,049,262
K5ZD/1	5,634,678
W1KM	5,405,034
OM8A	5,118,806
N2NT	4,932,482
CP6AA	4,727,241
G4BUO	4,624,704
3DAØNX	4,527,677
K4AAA	4,467,336
N2LT	4,440,944
YT1AD	4,379,760
XX9X	4,286,625
N6BV/1	4,206,576
W2RQ	4,201,950
K3ZO	4,189,419
KQ2M/1	4,006,080
7Z5OO	4,003,548
7X2RO	3,976,164
W1WEF	3,849,700
KT3Y	3,734,024
6Y6A	3,643,568
W3BGN	3,546,986
V85HG	3,481,249
YU7AV	3,358,966
K1AM	3,350,226
K5GN	3,269,966
G3ZEM	3,265,884
DJ6QT	3,205,776
W4RX	3,198,800
S53R	3,106,352

28 MHz

LU9AUY	123,804
EA7EZ	106,941
LU3HIP	97,644
S51AY	20,400
W4YV	13,041
GØAEV	8,030
K9OM	5,781
W6KFV	5,560
VE3HX	3,808
W7USA	3,780
UT1IA	3,740
UR7VA	3,315
N2AU	3,168

21 MHz

LU6ETB	1,689,548
TU2MA	606,500
US1E	601,338
G3TXF	462,757
JA5DQH	446,090
KC2X/4	405,578
4X/OK1JR	405,080
9HØA	341,481
UN7LG	338,995
N5KA	333,200
XV7SW	330,718
S50R	317,238
LU4FM	286,480
OI1AF	279,684
JA7FTR	240,465
N4BP	239,360

14 MHz

ED9EA	1,488,353
IG9/IT9GSF	1,202,568
CT9U	1,090,400
9Y4VU	1,066,296
CE3F	958,360
OK1RF	802,725
YM2ZW	794,664
OM5M	762,755
NI8L	732,240
YT1BB	698,660
S57DX	682,880
G3WVG	681,768
YU1ZZ	622,136
SL3ZV	586,416
W4PA	586,201
VA7A	582,143
TM1C	556,072
XO7A	547,575
GM6V	534,400
JA8YBY	530,196
K2KW/6	527,363
EI3DP	525,968
KB1SO	522,180
UN9LY	493,365
CW5W	491,556
OI1HS	461,292
W2II	450,708

7 MHz

IG9/AC6WE	1,285,833
YW1A	1,118,015
YT7A	982,222
LZ5W	975,084
RZ9UA	967,128
SP7GIQ	901,570
TA2BK	899,200
S50A	877,743
9A4D	859,265
IR4T	821,231
YL3IZ/MM	800,112
S57AL	737,372

3.5 MHz

EA8EA	1,204,350
IG9/I2VXJ	822,871
TIØC	791,208
SN2B	577,116
CT3FN	524,160
TK5NN	470,856
UA2FJ	470,196
OK2RZ	437,052
UN7CW	427,840
ES6DO	398,398
YTØT	384,970

1.8 MHz

CG1ZZ	240,660
KP2A	217,668
SP5GRM	190,375
4X4NJ	164,820
YU1EA	144,980
EA8ZS	131,580
HA6NY	129,274
EI7M	128,492
F6EZV	124,331
OM5ZW	123,497
9A2VR	116,667

LOW POWER ALL BAND

3V8BB	5,605,848
VP2EEB	5,039,580
VP5EA	3,231,072
WP2Z	3,020,320
4X7A	2,315,040
S59AA	2,289,502
K2SG	2,248,048
N2BA	2,177,556
6W1AE	2,142,000
KN4T	1,804,045
UAØJB	1,764,990
SP4EEZ	1,704,080
G4KIV	1,654,624
RS0F	1,586,140
S51EA	1,531,812
OHØJJS	1,477,216
J87GU	1,450,756
OH4YR	1,287,637
S51FA	1,283,100
VU2MTT	1,253,602
VK2AYD	1,248,520
RA9AE	1,242,108
KM1X	1,176,100
VU2PAI	1,163,136
K7SV/4	1,120,176
TA3D	1,094,185
DL8OBC	1,093,092
LU8HSO	1,091,657
WT1O	1,089,948
EA3CA	1,068,072
VE1GN	1,062,096
SP9XCN	1,028,874
YU7CB	1,027,793

28 MHz

LU5UL	256,520
LW4DYI	256,305
LU6MFD	105,450
VK4XA	54,372
PY1KS	53,680
EA6ZY	27,306
LZ2GS	21,080
LU7HTJ	15,200
EA3AFW	7,000
EA7BJV	5,676
JH4FBV	5,520
BD4SE	4,056
JH4WBY	3,360

21 MHz

LU7FJ	657,850
PY1KN	396,845
ON4RU	335,832
N8II	335,720
PU2MHB	321,152
ZC4EE	268,488
F5PGP	268,380
L5V	258,602
Z31JA	249,232
S57J	230,971
EA1AK/7	204,525
EA7GTF	198,170
UA9YAB	178,852
OK1ABP	166,155
WB4TDH	163,064
AH8N	152,810
XK7AHA	150,696

14 MHz

LU3FSP	558,846
Z39M	417,534
VK2APK	392,448
YU7BJ	369,600
OL7Z	369,264
ES2RJ	358,028
EA2CLU	349,110
S58AL	317,687
S57T	313,698
DL1YAW	285,510
EI6FR	264,537
N4MO	263,952
LY6M	262,190
RN3QO	250,656
OK2BVM	212,382
JL1MUT	212,296
ON4AEB	201,228
JA2XI	191,174

7 MHz

LU1IV	916,776
EA8CN	540,870
VK6VZ	407,365
HI3JH	406,461
PA3AAV	292,410
Z32XX	264,550
UR5FEL	260,311
CO2JD	234,987
S54A	210,826
S52SK	188,340
EA8NQ	185,627
DKØMM	169,092
SP9NLK	163,856
HA5NK	156,890

3.5 MHz

Z31JA	186,030
IK4WMG	169,440
HA8PG	168,700
OHØMMF	151,619
9A4RU	148,798
ER3DX	125,672
EA5FV	107,310
UA9CBM	99,620
UA9WQK	83,600
VK6LW	83,300
OM5KM	74,632
RW9AV	71,500
OH1TN	69,978

1.8 MHz

HA8BE	121,408
OH4JLV	102,600
UA9CI	86,156
US7ZM	65,780
OM3OM	65,160
UN5J	61,172
ON6YH	57,096
UA2FT	49,664
YL2VW	45,414
OIØMEP	43,815
RA4NW	43,516

QRP ALL BAND

ZX2X	809,684
AA2U	548,744
K1RC	458,700
UT5UN	447,005
F6OIE	402,535
LY3BA	342,342
LY2FE	335,892
K3DI	325,584
DL3KVR	309,358
DLØQW	304,795
KA1CZF	303,150
UR5MTA	266,409
K2PH	263,652

ASSISTED ALL BAND

PYØFF	9,809,206
K1NG	5,130,279
W2UP	4,898,520
K3WW	4,688,902
W2XX	4,243,620
K2WK	3,822,029
K3MM	3,732,190
AA1K/3	3,687,344
DK3GI	3,644,260
K2TW	3,525,006
K2SX/1	3,309,199
N3AD	3,222,824
K3NZ	3,096,250
N2MM	3,042,774
M6T	2,905,920
W3EEE	2,756,040
JH7PKU	2,649,527
NN4T	2,564,968
K5MA/1	2,556,822
N4AF	2,544,373
N3RR	2,484,690

MULTI-OPERATOR SINGLE TRANSMITTER

J6DX	12,218,074
D44BC	10,249,802
K1AR	9,081,046
OT6T	9,060,287
IQ4A	8,903,614
EA6IB	8,762,154
TM2Y	8,046,064
HG1G	7,999,292
FS5PL	7,906,296
LZ9A	7,701,960
SN2B	7,598,404
3C5A	7,550,220
KHØDQ	7,328,070
VE3EJ	7,261,212
ZF2RF	6,499,584
OK5W	6,462,775
DL6RAI	6,131,468
K1ZZ	5,985,904
HSØAC	5,945,460
OI2E	5,930,904
XE2L	5,833,080
EX9A	5,759,226
K0RF	5,608,095
JY8B	5,431,459
RW2F	5,418,240
W4WA	5,401,205
JA3ZOH	5,400,940
OE3S	5,208,147
UU5J	5,068,668

MULTI-OPERATOR MULTI-TRANSMITTER

5V7A	28,281,246
9A1A	17,752,262
J39A	15,995,368
N2RM	15,031,566
W3LPL	14,860,818
KC1XX	13,158,717
K3LR	13,022,625
DFØHQ	12,100,326
N3RS	11,871,290
K1KI	11,633,804
LY5A	11,589,501
VE9DH	10,958,810
EA4ML	9,815,954
EM2I	9,683,245
PI4COM	9,291,478
W3EA	9,242,354
EM2I	9,003,738
JH5ZJS	9,002,664

EUROPE ALL BAND

GIØKOW	6,197,970
OM8A	5,118,806
G4BUO	4,624,704
YT1AD	4,379,760
YU7AV	3,358,966
G3ZEM	3,265,884
DJ6QT	3,205,776
S53R	3,106,352
S51BO	3,049,208
YU7BW	3,042,109
EA2IA	3,007,087
DK8ZB	2,944,800
OH1NOR	2,941,664
GØIVZ	2,884,192
RN6BY	2,835,726
UT2QT	2,817,936
RZ3Q	2,699,284
YL8M	2,486,938
OZ1LO	2,338,721
US5WE	2,278,740
ERØF	2,079,696
RZ6LJ	1,949,373
OI6YF	1,927,074
OY1CT	1,813,686
IU2E	1,734,720
SP9DWT	1,292,336

28 MHz

S51AY	20,400
GØAEV	8,030
UT1IA	3,740
UR7VA	3,315
OK1TW	1,995

21 MHz

US1E	601,338
G3TXF	462,757
9HØA	341,481
S50R	317,238
OI1AF	279,684
SP9HWN	234,024
RZ3BW	199,068
DK5QN	184,824
7SØMG	155,078
EA1FEL	125,364
UT7LA	122,960
OH6MRA	117,838
OK1AES	116,000

14 MHz

OK1RF	802,725
OM5M	762,755
YT1BB	698,660
S57DX	682,880
G3WVG	681,768
YU1ZZ	622,136
SL3ZV	586,416
TM1C	556,072
GM6V	534,400
EI3DP	525,968
OI1HS	461,292
F6DKV	354,144
UT7L	303,264
DJ5JH	301,416
DF4SA	296,604
SP2FWC/P	294,350

7 MHz

YT7A	982,222
LZ5W	975,084
SP7GIQ	901,570
S50A	877,743
9A4D	859,265
IR4T	821,231
S57AL	737,372
UR6QA	696,675
HGM3O	681,292
HA9BVK	547,896
RW4AA	523,152
TM7XX	517,533
9A6K	479,631
DK5PD	458,830
OI1AB	392,960
OK1KSD	384,780

3.5 MHz

SN2B	577,116
TK5NN	470,856
UA2FJ	470,196
OK2RZ	437,052
ES6DO	398,398
YTØT	384,970
LA9VDA	378,998
9A7A	378,576
YT1I	333,855
LY6K	333,606
S57O	282,226
EU1AA	268,660
UUØJM	268,402

1.8 MHz

SP5GRM	190,375
YU1EA	144,980
HA6NY	129,274
EI7M	128,492
F6EZV	124,331
OM5ZW	123,497
9A2VR	116,667
SM6CPY	108,474
SL3ZV	107,738
SM6DOI	106,454
GW6J	101,708
YL2SM	100,700

LOW POWER ALL BAND

S59AA	2,289,502
SP4EEZ	1,704,080
G4KIV	1,654,624
S51EA	1,531,812
OHØJJS	1,477,216
OH4YR	1,287,637
S51FA	1,283,100
DL8OBC	1,093,092
EA3CA	1,068,072
SP9XCN	1,028,874
YU7CB	1,027,793
S57U	1,024,690
GD4UOL	954,448
IKØYVV	911,942
DJ5BV	867,850
RA3CW	860,228
SP2QCH	842,214
DF4ZL	824,172
US2YW	810,873
I3JTE	801,540
DL4FMA	800,797
EC3AIC	788,840
DK5MV	777,240
YO8FR	763,310

28 MHz

EA6ZY	27,306
LZ2GS	21,080
YU1HA	3,192
SP9LAB	2,760
Z32KV	858
SMØMRP	666
I3MLU	630
DF5WN	598

21 MHz

ON4RU	335,832
F5PGP	268,380
Z31JA	249,232
S57J	230,971
EA1AK/7	204,525
EA7GTF	198,170
OK1ABP	166,155
RZ6HX	130,284
OK2SAT	129,794

Say You Saw It In CQ

RA1ZF 125,172
Z32XA 118,459

14 MHz

Z39M 417,534
YU7BJ 369,600
OL7Z 369,264
ES2RJ 358,028
EA2CLU 349,110
S58AL 317,687
S57T 313,698
DL1YAW 285,510
EI6FR 264,537
LY6M 262,190
RN3QO 250,656
OK2BVM 212,382
ON4AEB 201,228
4N1N 184,128
IU9AF 170,107
ON6CW 156,338

7 MHz

PA3AAV 292,410
Z32XX 264,550
UR5FEL 260,311
S54A 210,826
S52SK 188,340
DKØMM 169,092
SP9NLK 163,856
HA5NK 156,890
OK1YM 138,556
S52OT 130,284

3.5 MHz

Z31JA 186,030
IK4WMG 169,440
HA8PG 168,700
OHØMMF 151,619
9A4RU 148,798
ER3DX 125,672
EA5FV 107,310
OM5KM 74,632
RW9AV 71,500
OH1TN 69,978

1.8 MHz

HA8BE 121,408
OH4JLV 102,600
US7ZM 65,780
OM3OM 65,160
ON6YH 57,096
UA2FT 49,664
YL2VW 45,414
OIØMEP 43,815
RA4NW 43,516
LY2OU 27,255
UX2MF 24,852

QRP, ALL BAND

UT5UN 447,005
F6OIE 402,535
LY3BA 342,342
LY2FE 335,892
DL3KVR 309,358
DLØQW 304,795
UR5MTA 266,409
I3BBK 235,879
YU1LM 231,075
UA4YJ 216,814
OH7NVU 200,080
YU1KN 185,941

ASSISTED ALL BAND

DK3GI 3,644,260
M6T 2,905,920
DJ2YA 2,058,516
HA1AG 1,698,588
DL3KDV 1,350,543
DFØDF 1,301,586
DL1GGT 1,252,628
SM3EVR 1,229,856
DF4RD 1,086,420
YZ7ED 913,126
DJ9MH 865,725
G3SWH 832,104

MULTI-OPERATOR SINGLE TRANSMITTER

OT6T 9,060,287
IQ4A 8,903,614
EA6IB 8,762,154
TM2Y 8,046,064
HG1G 7,999,292
LZ9A 7,701,960
SN2B 7,598,404
OK5W 6,462,775
DL6RAI 6,131,468
OI2E 5,930,904
RW2F 5,418,240
OE3S 5,208,147
UU5J 5,068,668
LZ7M 4,985,080
RW6AWT 4,980,096

MULTI-OPERATOR MULTI-TRANSMITTER

9A1A 17,752,262
DFØHQ 12,100,326
LY5A 11,589,501
EA4ML 9,815,954
EM2I 9,683,245
PI4COM 9,291,478
EM2I 9,003,738
S53M 8,998,770
DLØKF 5,102,208
OZ5W 3,689,350
J45T 3,434,992
GU3HFN 2,926,183

UNITED STATES ALL BAND

K5ZD/1 5,634,678
W1KM 5,405,034
N2NT 4,932,482
K4AAA 4,467,336
N2LT 4,440,944
N6BV/1 4,206,576
W2RQ 4,201,950
K3ZO 4,189,419
KQ2M/1 4,006,080
W1WEF 3,849,700
KT3Y 3,734,024
W3BGN 3,546,986
K1AM 3,350,226
K5GN 3,269,966
W4RX 3,198,800
W9RE 3,074,760
N2IC/Ø 2,987,952
K1VR 2,793,120
NJ2L 2,659,398
N4CW 2,283,380
K4AB 1,956,864
K5NA 1,928,595
K5YA 1,888,952
K5YAA 1,764,447
AA4S 1,758,200
K6LA 1,731,660
W9LT/8 1,704,303

28 MHz

W4YV 13,041
K9OM 5,781
W6KFV 5,560
W7USA 3,780
N2AU 3,168

21 MHz

KC2X/4 405,578
N5KA 333,200
N4BP 239,360
K6AW 208,684
W6YA 197,370
K7QQ 177,840
W9XT 152,766
K4WA 129,794
W9GIL 80,968
K4SI 76,500
WØKFL 35,010

14 MHz

NI8L 732,240
W4PA 586,201
K2KW/6 527,363
KB1SO 522,180
W2II 450,708
NU6S 449,652
N4PN 388,516
K9QVB 347,732
WB9HRO 316,333
W5FO 299,131
KV4P 244,098
W9OF 231,012

7 MHz

K1ZM/2 624,190
WØUN 554,645
W7GG 512,895
N7DD 382,704
WS1M 276,219
W3PP 266,294
K5TR 261,510
W6XA/4 196,788
W4OX 182,484
W8JGU 179,220
W7CB/6 154,044
K8UNP/4 138,725

3.5 MHz

W1MK 340,502
K9DX 162,941
K4PI 143,676
N6AR/4 142,972
K8MFO 103,092
K2PS 92,448
KØKX 63,750

1.8 MHz

K8MK 51,840
W4DR 40,500
K1UO 35,840
WB9Z 27,473

W2VO 25,754
K4TEA 19,856
W8UVZ 17,064
K2LP/1 7,080
KØCS 2,030

LOW POWER ALL BAND

K2SG 2,248,048
N2BA 2,177,556
KN4T 1,804,045
KM1X 1,176,100
K7SV/4 1,120,176
WT1O 1,089,948
WA7BNM/6 925,056
NA2U 784,080
W6JTI 707,124
WO4O 654,372
N4YDU 624,624
WW2R/5 518,375
K1HT 515,596
K4FPF 472,290
K1NO 461,692
W9AU 434,712
N2ED 427,721
W8PC/4 405,072

28 MHz

W3EP/1 2,752

21 MHz

N8II 335,720
WB4TDH 163,064

WA1FCN 85,239
AI2C/4 60,604
W5ZO 51,146
KD4FAZ 41,040
WA6FGV 19,966

14 MHz

N4MO 263,952
K2MFY 163,240
K7ZA 120,448
KI7DM 102,569
WB2ZMK 49,197
W6QJI 26,242
K6CEO 12,978
N9GEB 5,934

7 MHz

AA2SZ 93,765
W4HM 70,566
KØOD 68,655
N9AU 44,240
WW3S 42,925
K8UC 32,508
K6OMB/7 28,480

3.5 MHz

W1UK 50,713
N4TZ/9 35,200
W2ESX 16,500
WV1C 7,395

1.8 MHz

W4ONO 1,269

QRP ALL BAND

AA2U 548,744
K1RC 458,700
K3DI 325,584
KA1CZF 303,150
K2PH 263,652
N1AFC 254,400
KV8S 250,240
K5IID/8 238,283
W8ILC 121,179
W4DEC 60,760

ASSISTED ALL BAND

K1NG 5,130,279
W2UP 4,898,520
K3WW 4,688,902
W2XX 4,243,620
K2WK 3,822,029
K3MM 3,732,190
AA1K/3 3,687,344
K2TW 3,525,006
K2SX/1 3,309,199
N3AD 3,222,824
K3NZ 3,096,250
N2MM 3,042,774
W3EEE 2,756,040
NN4T 2,564,968
K5MA/1 2,556,822
N4AF 2,544,373

MULTI-OPERATOR SINGLE TRANSMITTER

K1AR 9,081,046
K1ZZ 5,985,904
KØRF 5,608,095
K8LX 4,693,455
W4WA 5,401,205
K1OZ 4,420,548
KVØQ 3,945,920
W8AV 3,944,820
W3GG 3,567,645
K1KP 3,300,507
KB1H 3,157,954
K1GW 3,033,980

MULTI-OPERATOR MULTI-TRANSMITTER

N2RM 15,031,566
W3LPL 14,860,818
KC1XX 13,158,717
K3LR 13,022,625
K1KI 11,633,804
W3EA 9,242,354
K1TI 7,868,097
K1TTT 7,818,528
KS9K 7,490,091
K2LE/1 7,122,720
K8CC 6,775,514
K4VX/Ø 5,533,522
W4MYA 5,002,448
K3ANS 4,941,090
W7RM 4,307,520
WØAIH/9 4,167,327

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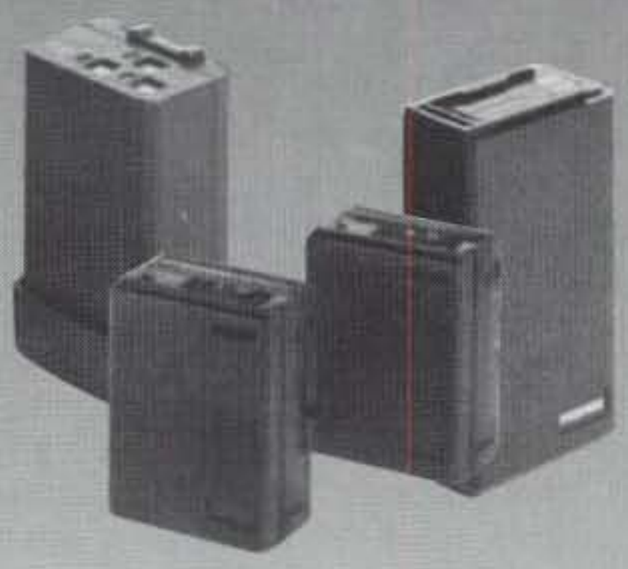

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CIRCLE 84 ON READER SERVICE CARD

Looking Ahead

This month let's beak out our sometimes cloudy DX crystal ball and look ahead in three different areas: changes in the DXCC countries list, sunspot Cycle 23, and the future of major DXpeditioning.

KB5GL, DXer of the Year JA1BK, and DXCC Coordinator K5FUV at the 1996 New Orleans International DX Convention. The 1997 NOIDXC is August 22–23.

Hong Kong: A Change in The DXCC List

DXers are always interested in potential changes to the current DX Century Club's Countries List. The next such change probably will be effective at the end of this month. On June 30, 1997 the British colony of Hong Kong, on the China coast, will become a Special Administrative Region of China, ending more than 150 years of British rule.

For the purposes of amateur radio, this amounts to an annexation of Hong Kong by China. Such an action almost always means that the annexed "country" ceases to exist and is deleted from the list of current countries. DXers who have not yet worked a station in Hong Kong should do so this month, or such chance likely will be gone forever. Fortunately, Hong Kong is relatively easy to work from most parts of the world, and most DXers should already have their VS6 or VR2 QSL cards.

Incidentally, the VR2 prefix will remain in use in Hong Kong even after the Chinese takeover at the end of the month. British telecom authorities have agreed to transfer the VR prefix allocation to China, which intends to reserve the use of that prefix for its Special Administrative Region of Hong Kong. This in turn means that Pitcairn Island will sport a new prefix soon. With China assuming control over the VR prefix, Pitcairn amateurs no longer will be able to use VR6.

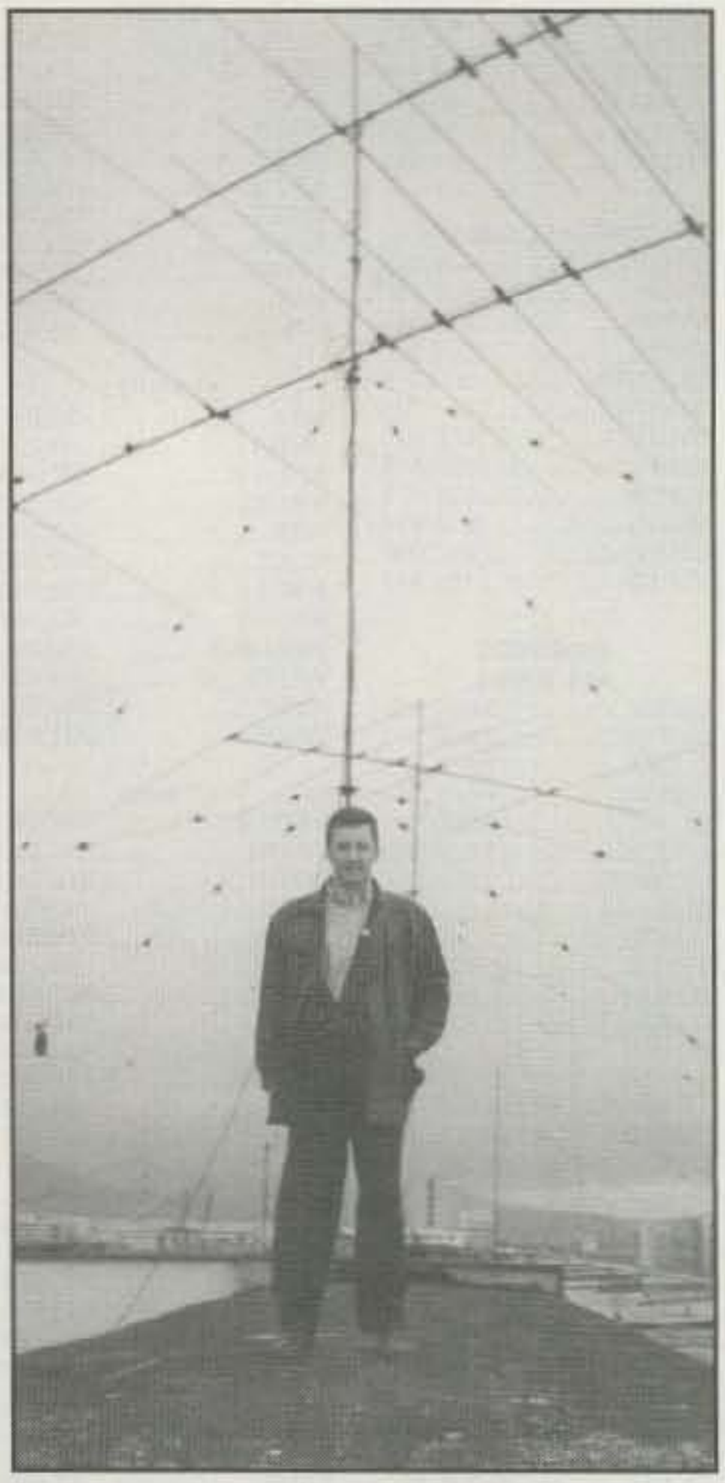
Hong Kong is home to some six million inhabitants, about 90% Chinese. The colony has long been a refuge for Chinese fleeing government changes in China. Hong Kong lies at the mouth of the Pearl River and was first used as a hiding place for opium smugglers. China actually went to war with England over the opium smuggling into China. When China lost the war in 1842, England took as its war spoils the island portion of what is now Hong Kong. In 1860 England annexed the mainland portion of Hong Kong. In 1898 England signed a 99-year lease for the mainland portion of the colony. It is the expiration of that lease that has led to England ceding both the mainland and island portions of the colony back to China. The 400 square miles of land that comprise the inhabitable portion of the region include some of the most densely populated places on earth. It has long been a major port, thanks to its excellent deep-water harbor, and a center for trade throughout the region. Look for Hong Kong to retain its value as a port and trade center under Chinese rule.

What effect the change in government will have on amateur radio in the region cannot be predicted, but since Hong Kong will no longer have any particular interest as far as DXing is concerned, any such changes will have little or no effect on DXers, except for cutting the number of current DXCC countries by one.

(Incidentally, I am writing this in England. I am on an extended holiday here, staying in Teddington, Twichenham Borough, Kingston-upon-Thames, which is why there were no VP2ML-hosted cocktails parties at Visalia (actually Fresno this year) and Dayton. See you all next year.)

Sunspot Cycle 23

The other hot topic among DXers everywhere, after changes in the DXCC countries list, is sunspots. Lately we have been talking about the lack of such spots. That may be beginning to change (finally!). In September 1996 the Space Environment Center sponsored a conference about sunspot Cycle 23, the next such cycle.



Vlado, Z32KV, visits the antenna farm of the LZ1KDP radio club in Sofia, Bulgaria.

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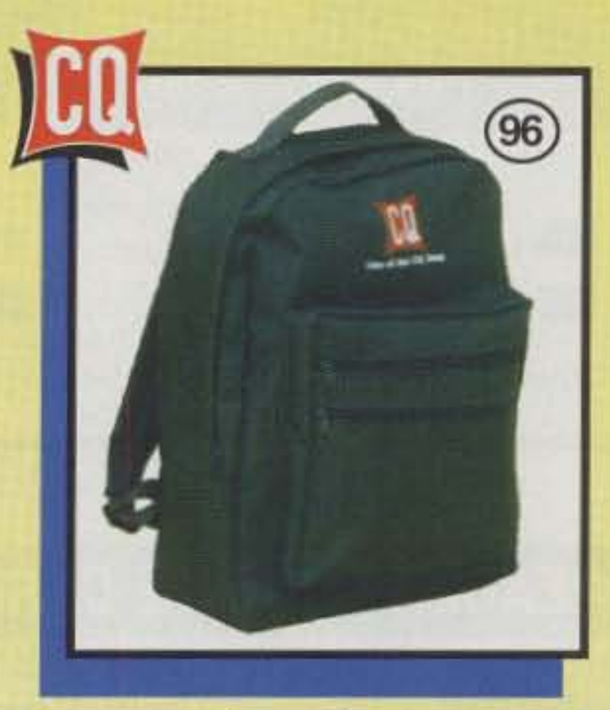

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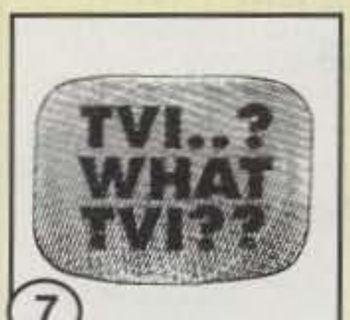

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SSB

2628.....N3TA 2631.....K6TV
2629.....IK7CNX 2632.....EA2CLU
2630.....N8IBW

CW

2947.....IK3XJP 2948.....EA2CLU

Mixed

1776.....F6EEM 1777.....K6TV

CW: 350 IK3XJP, EA2CLU. 400 EA2CLU. 450 JR6LLN, EA2CLU. 500 JR6LLN, ZB2EO, EA2CLU. 550 JR6LLN, ZB2EO, EA2CLU. 600 JR6LLN, ZB2EO, EA2CLU. 650 JR6LLN, ZB2EO, EA2CLU. 700 JR6LLN, ZB2EO, EA2CLU. 750 ZB2EO, EA2CLU. 800 ZB2EO. 850 ZB2EO. 900 ZB2EO. 950 ZB2EO. 1000 ZB2EO. 1050 ZB2EO. 1100 ZB2EO. 1150 ZB2EO. 1200 ZB2EO. 1250 ZB2EO. 1300 ZB2EO, JA7FFN. 1850 OZ5UR. 1900 OZ5UR.
SSB: 350 IK7CNX, K6TV, EA2CLU. 400 IK7CNX, EA2CLU, N1SHM. 450 IK7CNX, ON4BCM, EA2CLU. 500 IK7CNX, EA2CLU. 550 IK7CNX, EA2CLU. 600 IK7CNX, EA2CLU. 650 IK7CNX, EA2CLU. 700 IK7CNX. 750 IK7CNX. 800 IK7CNX. 850 IK7CNX. 900 IK7CNX. 950 IK7CNX. 1000 IK7CNX. 1050 IK7CNX. 1450 JR4NUN. 1500 JR4NUN. 1650 EA5OL. 1700 EA5OL. 1750 EA5OL. 2150 KD9OT. 2200 KF7RU.
Mixed: 450 F6EEM, ON4CAS. 500 ON4CAS. 650 PA2164. 1800 K4BU. 1850 K4BU. 1900 K4BU. 1950 K4BU. 2000 K4BU. 2050 K4BU.

10 meters: F6EEM
20 meters: JA4BAP, N1SHM, ON4CAS
80 meters: N3TA

No. Amer.: N3TA
Europe: ON4CAS

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Award of Excellence with 160 Meter bar: S57J
Award of Excellence Plaque Holders: K6JG, N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, I0JX, WA1JMP, KØJN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, W8RSW, WA4QMQ, W8ILC, VE7DP, K9BG, W1BWS, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS. I8YRK, SMØAJU, N5TV, W6OUL, WB8ZRL, WA8YTM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, KBØG, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, YU2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MS, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IV4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBP, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, S53EO, DF7GK, S57J, EA8BM, DL1EY, KØDEQ.

Award of Excellence Plaque Holders with 160 Meter Endorsement: K6JG, N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8RSW, W8ILC, K9BG, W1BWS, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SMØDJZ, DK5AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR2QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N6JV, ONL-4003, W5AWT, KBØG, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, KØDEQ.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101-9511 USA.

(The Space Environment Center is the organization that produces the WWV "numbers.") The consensus forecast was for a cycle similar to Cycle 22, the cycle that lasted from 1986 to 1996. The scientists predicted a 13-month smoothed sunspot peak of about 160, which compares nicely with the peak of 158.5 for Cycle 22. This would correspond to a smoothed solar flux of about just over 200. The scientists felt that the chances of another monster cycle such as Cycle 19, which peaked at a smoothed sunspot number of 200 in the late 1950s, is small. However, with modern equipment and more bands, DXers probably will find DXing in Cycle 23 as good as that of Cycle 19's peak.

While the scientists were reasonably confident about the size of Cycle 23, they were less definite about the timing of the cycle. Last September space weather scientists did not know when the solar minimum would occur. Thus, they suggested that Cycle 23 would peak between January 1999 and June 2001 with an average date of March 2000. Since that time, however, we have seen some positive signs that Cycle 22 has indeed ended, and thus Cycle 23 began. The little solar "hiccup" at the end of 1996 has reversed the steady decline of the 13-month smoothed sunspot number and has suggested that we are on our way to increasing sunspot

The WAZ Program

Single Band WAZ

12 Meter SSB

10.....CT1BH

15 Meter SSB

503.....JA7FEX

17 Meter SSB

12.....CT1BH

20 Meter SSB

1003.....IK2HAB

160 Meter WAZ

111.....KC7V, 30 Zones New

All Band WAZ

SSB

4373.....F6IMB 4375.....EA1MK
4374.....GØMPR 4376.....W7HBK

CW/Phone

7734.....F6EEM 7736.....DL2JON (CW)
7735.....W8EB 7737.....9A2OU

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

CQ DX Awards Program

SSB

2219.....VE4ROY	2221.....XE1VIC
2220.....9A9R	2222.....KA4IKH

CW

959.....BV7WB

SSB Endorsements

320.....WD8MGQ/328	275.....9A9R/277
320.....I1EEW/328	200.....N1RT/238
320.....XE1VIC/326	3.5/7 MHz.....9A9R
320.....VE4ACY/322	3.5/7 MHz.....XE1VIC
310.....W8AXI/319	28 MHz.....XE1VIC

CW Endorsements

310.....I1EEW/311

Total number of active countries is 328. The basic award fee for subscribers to *CQ* is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an SASE is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business-size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for airmail reply. Please make all checks payable to the awards manager.

5 Band WAZ

As of February 28, 1997, 453 stations have attained the 200 Zone level.

New recipients of 5 Band WAZ Award with all 200 Zones confirmed:

None

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)	OH2DW, 199 (1)
AA4KT, 199 (26)	IK1AOD, 199 (1)
K7UR, 199 (34)	DF3CB, 199 (1)
NAØY, 199 (26)	F6CPO, 199 (31)
WØPGI, 199 (26)	UA3AGW, 198 (1, 12)
W2YY, 199 (26)	VO1FB, 198 (1, 12)
W9WAQ, 199 (26)	EA5BCK, 198 (27, 39)
W1JR, 199 (23)	KZ4V, 198 (22, 26)
VE7AHA, 199 (34)	K4PI, 198 (22, 26)
W1FZ, 199 (26)	G3KDB, 198 (1, 12)
W9CH, 199 (26)	DK2GZ, 198 (1, 24)
ACØM, 199 (34)	KG9N, 198 (18, 22)
IK8BQE, 199 (31)	KM2P, 198 (22, 26)
JA2IVK,199 (34,40m)	GM3YOR, 198 (12, 31)
K1ST, 199 (26)	DKØEE, 198 (19,31)
ABØP, 199 (23)	KØSR, 198 (22, 23)
KL7Y, 199 (34)	K3NW, 198 (23, 26)
UY5XE, 199 (27)	WB6OKK, 198 (22, 37)
NN7X, 199 (34)	S57J, 198 (2,26)
DL3ZA, 199 (31)	W3RU, 198 (23, 26)
OE6MKG, 199 (31)	UA4PO, 198 (1, 2)
HA8IB, 199 (2 on 15)	K5RT, 198 (22, 23)
DK1FW, 199 (31)	JA1DM, 198 (2, 40)

The following have qualified for the basic 5 Band WAZ Award:

CT3FT, 192 Zones	OK1FPG, 169 Zones
HA7UW, 152 Zones	

1036 Stations have attained the 150 Zone level as of February 28, 1997.

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

numbers again. If this trend is confirmed, then Cycle 22 ended in May 1996, perhaps during the Dayton Hamvention.

Based on Cycle 23 beginning last May, the Space Environment Center now says that Cycle 23 will peak in the spring of the year 2000. Even better, however, is the prediction of when we should be seeing significantly improved band conditions due to increased solar flux. That prediction says that the smoothed solar flux should exceed 100 by July! At that level, we should see good openings on all bands, including 10 meters, by this fall's DX season.

The prediction is for the solar flux to continue to rise for the next 2½ years, exceeding 150 by next summer and reaching 200 by late 1999. This means DXing should be good or better from this fall all the way to the end of the year 2003. Great days lie ahead for the ever-patient DXer!

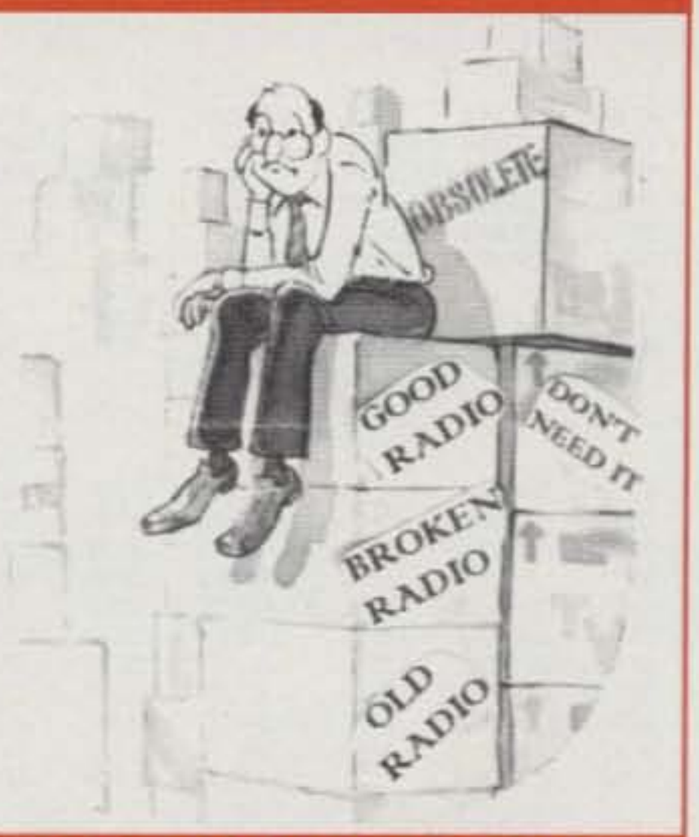
The Future of Major DXpeditioning

The next item we'll consider is the future of major DXpeditioning. I previously have discussed the XRØZ/XRØY DXpeditions several times. Now the organizer of those innovative operations has summarized not only the story of the operations, but also the comments, pro and con, on those innovations in a new book. *DX-Ahu* is Bob Schmieder, KK6EK's latest, and it is a must-read for every forward-looking DXer.

A large part of *DX-Ahu* is the detailed story of the DXpeditions themselves. KK6EK has a simply delightful approach to these stories, drawing the reader deep into the heart of the planning, the false leads, and the successes and miscues that are part of every major DXpedition. The XRØZ/Y story is especially interesting, as the location is of interest to millions, not just a few thousand amateurs who want to know every detail about getting on the air from some silly rock somewhere. Easter Island has been the object of much conjecture and a lot of hard scientific study, as well as the subject of dozens of wacky theories. No matter whether you are fascinated by the science or love crazy ideas, Easter Island has something for you. And so does *DX-Ahu*.

Many of us have dreamed about visiting this mysterious, far-off spot. (Easter Island is the most isolated, regularly inhabited place in the world, with only tiny Pitcairn with its 70 inhabitants within 2500 miles.) We can imagine standing before the ranks of moai (statues), wondering, as so many have done before us, why these statues are there and how they got there.

SITTING ON A TAX WRITE-OFF?



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THE WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with the CQ Master Prefix list. Scores are based on the current prefix total, regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no up-date, files will be made inactive. Lifetime Honor Roll fee is $4.00 (U.S.) for each mode, with no fee for additions.

MIXED

4705.....9A2AA	3415 .....VE3XN	3003.....9A2NA	2688 .....K9AGB	2200.....K5UR	1958 ....YU7JDE	1589 ....JN3SAC	1401.....F6HMJ	1003....KB5OHT
4194 .....IT9TQH	3299 .....I2UIY	2967 ...PAØSNG	2610 .....4N7ZZ	2183.....N6JM	1776.....W7OM	1588 .....KØIFL	1362 .....YU1ZD	999.....VE6FR
3773.....W2FXA	3295 .....N9AF	2948 .....HA8XX	2589...WB2YQH	2141 ...WA1JMP	1752 .....HA9PP	1587 .....AE5B	1329 .....KSØZ	967 .....JR3TOE
3756.....EA2IA	3290 .....N4UU	2879.....YU7SF	2486.....I2EOW	2131 .....W6OUL	1717 .....K5IID	1570.....KC6X	1317 .....Z32KV	953.....S52QM
3573 .....K6JG	3277.....N4MM	2834....YU7BCD	2455.....S53EO	2113.....W8UMR	1717.....IØAOF	1560....OZ1ACB	1289.....WØIZV	938.....VE7CBH
3452.....UA3FT	3229 ...SM3EVR	2832 .....IT9QDS	2375 .....HA5NK	2195.....N2AIF	1705 .....EA5M	1550...EA3CWK	1212.....WT3W	931 .....W2EZ
3451 .....N4NO	3141 .....YU1AE	2825.....K9BG	2349 .....IK2ILH	2094.....9A4RU	1699 .....CT1QF	1500....CT1EEB	1197 .....IT9JPK	850 .....US1IDX
3447 .....N6JV	3063.....KA5W	2745.....KF29	2344.....KØDEQ	2070.....KS4S	1683.....LU8DY	1436....VE4ACY	1122 .....N4PYD	838.....EA5BHK
3442.....W1BWS	3023...WA8YTM	2697.....N2AC	2303.....S51NU	2001 .....G4OBK	1623.....I2EAY	1402....I1-21171	1013 ...WB2PCF	636.....9A2AJ

SSB

4168 .....IT9QTH	2798 .....F2VX	2370 ....LU8ESU	2141.....EA5AT	1685.....N6FX	1488.....N2AC	1282.....NG9L	1055 .....IT9JPK	832 .....I6KYL
4127 .....IØZV	2777 .....IZ5EV	2365...WA8YTM	2084 .....KD9OT	1606.....YU7SF	1464.....K8MDU	1261 .....I3UBL	1054.....S51NU	828 .....I2EAY
3706.....VE1YX	2715.....I4CSP	2330.....KF2O	2077 .....N4UU	1574.....KS4S	1454.....K3IXD	1225.....KC6X	1006 .....WT3W	772.....LW2DBM
3571 .....ZL3NS	2678 .....N4NO	2290.....4X6DK	2044 .....K5RPC	1567 ...EA5CGU	1447.....K2EEK	1202...LU5EWO	971 .....DJ4GJ	759.....N3DRO
3345.....F6DZU	2595 .....KA5NW	2240.....I8KCI	2035.....EA1JG	1564.....N2AIF	1415.....HA5NK	1158 .....KØIFL	966.....KI7AO	748 .....JN3SAC
3312 .....K6JG	2588 .....HA8XX	2220....YU7BCD	2022.....CX6BZ	1559.....KBØC	1401 .....W7OM	1132....WA2FXF	959.....EA1AX	
3172..WD8MGQ	2584 ...PAØSNG	2216 .....WF4V	1933.....W4UW	1533 ....LU7HJM	1361 .....IK2AEQ	1115 .....DF7HX	918.....LU3HBO	
2957 .....CT4NH	2530.....I5ZJK	2212.....I2EOW	1906 .....IN3QCI	1503 ....CT1EEB	1355.....DK5WQ	1107....SV3AQR	873 .....HA9PP	
2884.....N4MM	2419....EA3AQC	2207....CT1AHU	1903.....K5UR	1501 .....AE5B	1349 .....K5IID	1101 .....KB4HU	860 .....IK4HPU	
2847.....EA2IA	2410.....I2MQP	2206 .....PY4OY	1748.....LU8DY	1501 ..CT1BWW	1332.....G4OBK	1100 .....EA8AG	852.....N1RT	
2834 .....I2UIY	2371.....9A2NA	2158 .....KF7RU	1723....OE2EGL	1489 .....W6OUL	1327 .....W5ILR	1068 .....N4PYD	846 .....JR3TOE	

CW

4109 .....IT9TQH	2808 .....K6JG	2262.....N4MM	1954 .....HA5NK	1708.....I7PXV	1500 .....EA6BD	1277 ....KA1CLV	1051.....4X6DK	863.....PY4WS
3709 ...WA2HZR	2627 .....K9QVB	2250 .....I2UIY	1910.....KF2O	1707.....G4SSH	1457 ....JN3SAC	1275 .....DJ4GJ	1023.....LU3DSI	863.....KB5OHT
3428 .....N6JV	2601.....YU7SF	2167.....W8IQ	1875.....TI4SU	1649.....N2AIF	1408 .....I2EAY	1219.....IK5TSS	993.....I2MQP	822.....9A3UF
3038....VE7CNE	2430.....N2AC	2151.....S51NR	1863 .....HA8XX	1608.....G4OBK	1357.....9A2HF	1183 .....K5IID	925 ....LW2EUE	712 .....KØIFL
3034.....YU7LS	2353.....G4UOL	2111.....S51NU	1823.....N6FX	1606 .....W6OUL	1356 .....IK2ECP	1182.....EA6AA	919 .....HA9PP	697.....K3WWP
2993 .....N4NO	2314...WA8YTM	2076 ....JA9CWJ	1796 .....OZ5UR	1559.....DJ1YH	1355 ...EA7AAW	1139 .....EA2CIN	903.....DF6SW	691 .....WT3W
2914 .....N4UU	2280.....KA5W	2035.....9A2NA	1767.....K5UR	1519.....LU2YA	1297 .....ZB2EO	1130.....AC5K	899 .....K2LUQ	630.....LY3BY
2819.....EA2IA	2264....YU7BCD	1982 .....KA7T	1722 .....VR2UW	1504 .....KS4S	1278.....W7OM	1072.....KC6X	891.....I2EOW	602.....LU6VCD

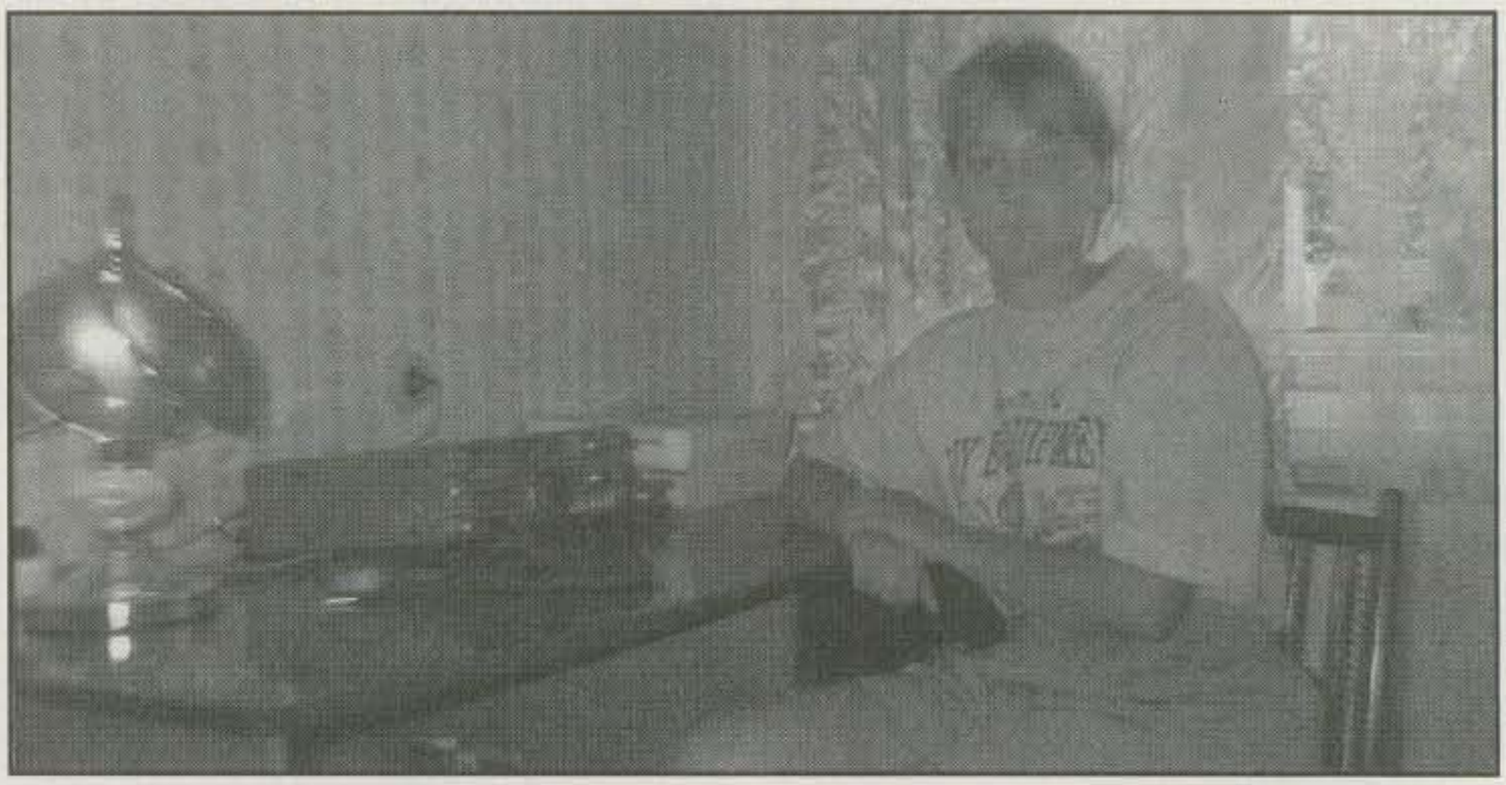
Throw in an extremely well-written story about a radically different kind of major DXpedition, and you have a great book.

The story of the DXpedition includes many excerpts from e-mail both to and from KK6EK. It's intriguing to follow the planning for the DXpedition, with hundreds of DXers, fellow scientists, divers, and potential operators commenting back and forth on dozens of subjects. This aspect of the book really draws the reader into the planning, almost like being a part of the planning team yourself. For the armchair DXpeditioner, you will never have felt so much a "part of the team" as when (not if!) you read *DX-Ahu*.

The part of the book about the actual operation from Easter Island is just as fascinating. Due to the innovations field-tested in this DXpedition, the operators received considerable feedback during the activity, including many individual messages via the Internet (more about these innovations later). The way KK6EK and the other members of the team responded to and reacted to this feedback again draws the reader right into the heart of the operation. At times you feel that you are seated at the big table in the GEM tent, eating your gourmet dinner, sipping fine wine, sharing a particularly appealing DX success with one of the operation's many distinguished guests. What's this? Great food and good wine on a DXpedition? *DX-Ahu* shows that KK6EK knows how to live, not just organize DXpeditions.

If *DX-Ahu* contained only the parts mentioned above, it would be an excellent chronology of a highly successful operation. However, the XRØY/Z operation was more than just a successful DXpedition. In fact, neither making the maximum number of contacts nor working the higher number of individual amateurs was a goal of the operation. A very large part of the trip was to field-test some techniques and ideas that previously had never been employed to any significant extent in a DXpedition. It is these ideas, their execution, including some failures and some successes, and the protracted debates on the merits of these innovations that make *DX-Ahu* the very best DXpedition book to date. *(Sorry, Bob, I know this knocks your book on the 3YØPI operation down to second place, but you have only yourself to blame.—ed.)*

Are electronic confirmations of contacts a good idea? Follow the debate in *DX-Ahu,* while noting that KK6EK's (with ON6TT) Heard Island operation used a different method. Can the idea of "preemptive QSLing" be fixed to pass DXCC desk concerns? Should DXpedition operators sell rocks from their country of origin? These and many other questions are thoroughly discussed, both pro and con, including many messages just as received by KK6EK on Easter Island. This



Nataly, UAØFFM/3, is QSL manager for 3W5FM. Her address is P.O. Box 66, Vladimir 600011, Russia.

QSL INFORMATION

Thanks to John Shelton of "The GOLIST" for the following QSL information. For more information on "The GOLIST," e-mail John at <golist@iswt.com>.

3D2/HB9DMM to HB9DMM
3EØS to HP2CWB
3W6JQ to JA1IED
3Y2GV to LA2GV
4A1FEC to XE1BEF
4H9RG to DU9RG
4S7SW to ON6TZ
4T4DX to OA4FW
4X/G3WQU to G3WQU
5A1A/OE5GRP to OE2GRP
5B4AGI to N4JR
5H3TW to K3TW
5N8NDP/9 to IK5JAN
5N9N to N2AU
5R8FH to I1PIN
7P8/OE2VEL to OE2GEN
8P9CI to W1USN
8P9JA to K4MA
8Q7AF to I8RIZ
9A5ØD to 9A1BHI
9G1BJ to G4ZCA
9H1PF to K5YG
9J2OR to W4CER
9K2F to 9K2HN
9K2RR to KU9C
9M2RY to N4JR
9M6TL to GØOPB
9N1AA to JM2HBO
9Q5BQ to PA3BGQ
9U5T to F2VX
9V1YC to AA5BT
A35UF to DL5UF
A35WA to DF5WA
A61AJ to K3LP
A61AT to AA6DC
AL7O to AL7BL
AP2KSD to IK7JTF
AX8NSB to VK8HA
AX9AZ to VK6UE
AZ9W to LU5UL
BY1QH/G3SWH to G3SWH
C31EJ to VE3GEJ
C56XX to GØUCT
CP8XA to DG9NB
CX8DX to F1NGP
CY1COP to VO1COP
D63KU to JA6NL
D68TW to K3TW
DU/W1DV to KO7V
EF3VGC to EA3NI
EI4VSN to N9TGR
EK17ØØJJ to GW3CDP
EL2AB to IKØPHY
EN2H to I2PJA
EU1AA to PA3BFM
EW1NY to N8LCU
FG5NR to F6BUM
FJ/N6DLU to N7UE
FJ5AB to N7UE
FK8VHM to F5TLP
FR5DT to F6FNU
FT5ZG to F5RQQ
H3ØS to HP2CWB
H44FN to HA8FW
H5ANX to ZS6EW
H8ØS to HP2CWB
HBØMX to HB9MX
HOØS to HP2CWB
HP1XBI to F6AJA
HS6CMT/3 to JA7FYF
IY4M to I4ABF
J39A to KQ1F
J43CRN to SV3YY
J45T to SV5TH
J52APM to IKØPHY
J75T to DL6LAU
JD1/JG8NGJ to JA8CJY
KC6BP to AA8HZ
KC6JJ to AA8HZ
KG4GC to WT4K
KG4QD to K4QD
KHØDQ to JF1SQC
KH2/K9AW to WF5T
KH2/WH6ASW to VK4FW
KH4/N4BQW to WA4FFW
KH8/N5OLS to AA5BL
KH8/NM7N to NM7N
LA5M to LA9VDA
LZØL to LZ1KCP
MMØALM to GMØPKX
MUØASP to F5SHQ
OA462QV to OA4QV
OD5/N4MUJ to N4JR
OHØA to OH2BH
OX3IPA to OZ5AAH
OY4TN to OY6FRA
P29VXX to DL7UFN
PQ5W to PP5WG
PYØF/PY1ZFO to W9VA
PZ5JB to AA3OE
RA2FZ to W3HNK
SØ7QF to EA4URE
S21XX to DL3NEO
S79GN to IK2GNW
T48RAC to VE3ESE
T97M to K2PF
TF5ØIRA to TF3IRA
TG8IGE to WK6Ø
TM1W to F8KLW
TOØR/MM to W4FRU
TT8ED to F5SEC
TT8WL to DL3IAW
TZ6FIC to F6KEQ
UX6H to I2PJA
V26HY to XW2A
V26RN to N5NJ
V31PU to N7UE
V44KAI to K2SB
V47KAC to N4RJ
V5/ZS6YG to WØYG/KYØA
V63KU to JA6NL
V73TR to AA8HZ
V85HY to JA1WTR
VKØTS to VK1AUS
VK3GNK to OE8GNK
VK4WGL to KB5GL
VP2EEB to AA3B
VP2EV to K7BV
VP2V/K1DW to K1CPJ
VP5EA to WD5N
VP5JP to K8JP
VP8CTR to UX1KA
VQ9UO to W3FUO
VQ9ZZ to NS1L
VR6DR to VR6PAC
VR6ID to VR6PAC
VR6MW to VR6PAC
VU2AXA/P to VU2DVC
VU2JPS to VK9NS
W1BRK/KHØ to JA1BRK
W1BRK/KH2 to JA1BRK
X9RHS/P to V9RHS
XL9NJ to K2NJ
XT2AR to W4BYG
XU2FB to N4JR
XU5AM to W7AAM
XX9Y to W3HCW
YB1XUR to YC1XUR
YC8TZR to YB5NOF
YI1US to WA3HUP
YI1WMS to IK2DUW
YM2ZM to OK1DTP
YN2OM to TI2OHL
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ZD8CJK to KF4OOX
ZF1RY to W6/GØAZT
ZF2NK to KBØYKN
ZK1DI/P to DK1RV
ZS6AL to KE4CLE
ZV8KL to PY4KL
ZWØZ to PY1NEZ
ZYØSG to PT7AA
ZZØZ to PY1NEZ

Sungki Lee, HL1IWD, on the right, visits with Nishi, V63AO, at the latter's home in Pohnpei in Micronesia. Sungki operated as V63CT during his December 1996 visit.

real-time analysis of some of the serious questions raised by the innovations used by the XRØY/Z operators is what makes *DX-Ahu* such an important book for serious DXers. The future of serious DXpeditioning has been changed by the operation, and DXers should learn about the debate behind those changes. And there will be more changes—many more in the future—and KK6EK has showed us how we can not only cast our vote pro and con, but actually be part of the process of dragging DX, kicking and screaming perhaps, into the 21st century. It is these debates that make *DX-Ahu* a special book for DXers, and one which should not be missed.

To top it off, there's still more to *DX-Ahu*. KK6EK also includes some of the participants' own comments. I am always amazed when I read the stories of the same operation written by more than one of the participants. You wonder if they were on the same operation, they are so different. You get a taste of this in *DX-Ahu*, too.

Then there's the analysis of the radio results—solar activity versus contacts, directional effects, beacon spotting, and much more. A student of radio propagation can find months of research projects in the information given.

And there's still more. What does pisco have to do with the operation (it wouldn't have happened with it!) and what *is* a DX-Ahu? For the answers to these questions, and a thoroughly enjoyable read, get a copy of *DX-Ahu*, put your feet up, and be prepared for the best DXpedition ever.

For information on how to obtain *DX-Ahu*, contact Bob Schmieder at Cordell Expeditions, 4295 Walnut Blvd., Walnut Creek, CA 94596. 73, Chod, VP2ML

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CIRCLE 27 ON READER SERVICE CARD

BY NORM VAN RAAY, WA3RTY

AWARDS

NEWS OF CERTIFICATE AND AWARD COLLECTING

This month we present two awards available, one sponsored by the Lugo DX Group of Lugo, Spain, and the other available from the Clube CB Costa Verde of Porto, Portugal. The Lugo Award is available to all radio amateurs and shortwave listeners. The Goncalves Zarco Award for contacting DXCC countries of the world per the accompanying table is available for various modes and bands.

The Lugo Award

The Award Lugo is sponsored by the Grupo DX Lugo and is available to all radio amateurs and shortwave listeners (SWLs). The award is free of charge and is 44 × 32 cm, printed in color. It was designed by the famous ceramic art factory Sagadelos.

The Grupo DX Lugo Award.

The award is issued according to the following rules:

1. Contacts must be with group members, except repeaters, after Jan. 1, 1983.

2. Contacts required are Spain 15, Europe 5, and DX 3.

3. The same station can be contacted on different bands, but only one contact in 24 hours with the same station.

4. Applicants must send QSLs or list certified by a radio association. QSLs will be returned by registered mail.

5. The same rules apply to SWLs.

The members of the Grupo DX Lugo are as follows.

EA1: AAA (ex: EC1DNO, AO1DNO), AAB (ex: EB1EQQ, EC1DLB, AO1DLB), ABC, ACI, ADN, AEV, AFQ, ARG, AUI, AUZ, AVW, BCA, BCB (ex: EH1BOB), BCD, BCT (ex: EC1DDI), BDT, BDU, BDV, BFT, BID, BIL, BJL, BJO, BJP, BPS, BPT, BVO, BVP, BVQ, BVS, BWH, CB (ex: EA1DFH), CDA, CJU, CJV, CKD, CKE, CKH, CMX, CMY, CO (ex: EA1CYU), CTD, CW (ex: ED1CW, ED1FSF = Oct/89, EF1FSF = Oct/89, ED1IDA = June/91, ED1ILT = Sept/92, ED0VDL = Sept/95), CYT, CYU, DAX (ex: EC1BCA, ED1DAX, AM1DAX), DCT (ex: EB1AUB), DFE (ex: EC1BJW), DHV, DJT (ex: EB1AYM, ED1DJT, ED1MFE), DLB, DLE, DQV, DSV, DWL (ex: EB1BMO), DWM (ex: EB1BMP), ECG, EDS (ex: EC1CDH), FDN (ex: EC1DEQ), FDO (ex: EC1DEO, AM1FDO, AO1DEO), FEQ (ex: EC1DFN, AO1DFN, and AM1FEQ), FFN (ex: EC1DEZ), GO (ex: EA1ABW), GU, HP (ex: EA1FBX, EC1DBC), IF (ex: EA1CYV, AM1IF, EC1ARO), JO (ex: AM1JO), JP (ex: EA1BNW, ED1JP), KN (ex: EC1CTH, AO1CTH, EF1AA, ED1KN), ML, MV (ex: ED1MV, AM1MV, ED1RTY, ED1PAL), OJ, QB, QU, US (ex: EC1CEG, EA1EVY), VM, VZ, WM, WN, ZA.

EA8: TB (ex: EA1QT).

EB1: BBU, BML, CEU, DHX, ENP, FIF, IAJ, WL.

EC1: AMQ, AMR, APM (ex: EB1HTY), CZZ.

Applications for the award should be sent to: Grupo DX Lugo, Manager "Diploma DX Lugo," P.O. Box 313, E-27080 Lugo, Espana.

Box 76, Pleasant Mount, PA 18453
e-mail wa3rty@epix.net

SPECIAL HONOR ROLL

Si Spisak, NØDPF
USA-CA All Counties #921
March 19, 1997

Harry Ward, W6TPC
USA-CA All Counties #922
March 19, 1997

HONOR ROLL

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W6TPC	1338	W6TPC	1031
1500		**3000**	
NØDPF	1198	NØDPF	937
W6TPC	1199	W6TPC	938

The total number of counties for credit for the United States of America Counties Award is 3076. The basic award fee for subscribers is $4.00. For nonsubscribers it is $10.00. Initial application must be submitted in the USA-CA Record Book, which may be obtained from *CQ* Magazine, 76 North Broadway, Hicksville, NY 11801 USA for $2.00. To qualify for the special subscriber rate, please send a recent *CQ* mailing label with your application. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 15, 1991. A complete copy of the rules may be obtained by sending an SASE to Norm Van Raay, WA3RTY, USA-CA Award Manager, Box 76, Pleasant Mount, PA 18453-0076 USA. DX stations must include extra postage for airmail reply.

Goncalves Zarco Award

Jao Gongalves Zarco was one of the original settlers of the Madeira archipelago. Zarco launched the foundation of the Portuguese colonization of those islands, making them a base for the soon to come explorations of Portuguese navigators under the direction of Prince Henry, The Navigator. He became famous mainly because of his work in organizing the island's society, which became the model for other islands discovered, settled, and developed by the Portuguese. This became the model of the government which exists there today, with a regional government and parliament. Zarco thus became the first of a long series of Portuguese names forever connected to the colonization of islands worldwide which were not only harbors for Portuguese sailors, but also places where the Portuguese population settled and spread their culture and their way of life.

The Goncalves Zarco Award sponsored by the Clube CB Costa Verde.

The Goncalves Zarco Award was created by the Clube CB Costa Verde to pay homage to the Zarco. To obtain it, each applicant must present evidence of a contact/reception with 20 DXCC countries, the territory of which is exclusively made up of one or more islands, under exclusive dependence, one of which must be Madeira Island. DXCC countries accepted for this award are listed in the accompanying table.

The award may be obtained in each of the following categories:

- CB (11 meters)
- HF (10, 12, 15, 17, 20, 30, 40, 80, and 160 meters)
- CW (telegraphy, all bands)
- Digital modes (RTTY, AMTOR, PACTOR, and Packet, all bands)
- Satellite (all modes)
- SWL (all bands, all modes)

Photocopies of a station's logs or QSL cards are accepted as proof of contact, as long as

DXCC Countries Accepted For The Goncalves Zarco Award

OHØ	Aland Is.	CT3	Madeira
3B6	Agalega & St. Brandon Is.	8Q	Maldives
KH8	American Samoa	HKØM	Malpelo
KP2	American Virgin Is.	9H	Malta
FT5Z	Amsterdam & St. Paul Is.	RIMV	Malyj Vysotskij Is.
VU/A	Andaman & Nicobar Is.	KHØ	Mariana Is.
VP2E	Anguilla	ZS8	Marion & Prince Edward Is.
CE9	Antarctica	OHØM	Market Reef
V2	Antigua & Barbuda	V7	Marshall Is.
P4	Aruba	FM	Martinique
ZD8	Ascension	3B8	Mauritius
ZL9	Auckland & Campbell Is.	FH	Mayotte
VK	Australia	VK9M	Mellish Reef
YVØ	Aves Is.	V6	Micronesia
CU	Azores Is.	KH4	Midway
C6	Bahamas	JD1/M	Minami Torishima
A9	Bahrein	VP2M	Montserrat
KH1	Baker and Howland Is.	C2	Nauru
EA6	Balearic Is.	KP1	Navassa Is.
T33	Banaba Is	PJ2	Netherlands Antilles
8P	Barbados	FK	New Caledonia
VP9	Bermuda	ZL	New Zealand
3Y1B	Bouvet Is.	ZK2	Niue
VP2V	British Virgin Is.	VK9N	Norfolk Is.
EA8	Canary Is.	ZK1N	North Cook Is.
D4	Cape Verde	JD1/Ø	Ogasawara Is.
ZF	Cayman Is.	3CØ	Pagalu Is.
T31	Central Kiribati	KH5	Palmyra & Jarvis Is.
VQ9	Chagos Is.	3Y1P	Peter I
ZL7	Chatham	DU	Philippines
VK9X	Christmas Is.	VR6	Pitcairn
FØ/C	Clipperton	BV9P	Pratas Is.
T19	Cocos Is.	KP4	Puerto Rico
VK9C	Cocos-Keeling Is.	T8	Rep. of Belau
D6	Comoro	FR	Reunion
3D2C	Conway Reef	XE4	Revillagigedo Is.
TK	Corsica	3B9	Rodrigues Is.
SV9	Crete	3D2R	Rotuma
FTSW	Crozet Is.	CYØ	Sable Is.
KP5	Desecheo	HKØA	San Andres & Providencia Is.
SV5	Dodecanese Is.	CEØX	San Felix & San Ambrosio Is.
J7	Dominica	ISØ	Sardinia
T32	East Kiribati	BS7	Scarborough Reef
CEØY	Easter Is.	S7	Seychelles
VP8I	Falkland Is.	H4	Solomon Is.
OY	Faroes	ZK1S	South Cook Is.
PYØF	Fernando de Noronha	VP8G	South Georgia Is.
3D2F	Fiji Is.	VP8O	South Orkney Is.
RIFJ	Franz Josef Land	VP8S	South Sandwich Is.
FO	French Polynesia	VP8H	South Shetland Is.
HC8	Galapagos Is.	1S	Spratley Is.
FR/G	Glorioso Is.	4S	Sri Lanka
OX	Greenland	ZD7	St. Helen Is.
J3	Grenada	V4	St. Kitts & Nevis
FG	Guadeloupe	J6	St. Lucia
KH2	Guam	CY9	St. Paul Is.
GU	Guernsey	PYØP	St. Peter & St. Paul Rocks
KH6	Hawaii	FP	St. Pierre & Miquelon Is.
VKØH	Heard Is.	S9	St. Tome & Principe
TF	Iceland	J8	St. Vincent
GD	Isle of Man	JW	Svalbard Is.
6Y	Jamaica	BV	Taiwan
JX	Jan Mayen	ZK3	Tokelau Is.
JA	Japan	A3	Tonga
KH3	Johnston Is.	9Y	Trinidad & Tobago
FR/J	Juan de Nova & Europa Is.	ZD9	Tristan da Cunha & Gough Is.
CEØZ	Juan Fernandez Is.	FR/T	Tromelin Is.
FT8X	Kerguelen Is.	VP5	Turks & Caicos Is.
ZL8	Kermadec Is	T2	Tuvalu Is.
KH5K	Kingman Reef	KH9	Wake Is.
KH7K	Kure Is.	FW	Wallis & Futuna Is.
VU/L	Laccadive Is.	T30	West Kiribati
VK9L	Lord Howe Is.	SW	Western Samoa
VKØM	Macquarie Is.	VK9W	Willis Is.
SR	Madagascar		

they indicate date, frequency, and mode. Only for CB contacts is the submission of QSL cards compulsory. In this case, the cards must indicate the sender's address and clearly state the receiver.

Award requests must be addressed to: Clube CB Costa Verde, Ruling Committee for DX Activities, P.O. Box 4403, 4007 Porto, Portugal. With the request the applicant must supply his or her name and address, category(ies) applied for, and all necessary proof of contacts. Cost of the award is $4.00US for Clube CB Costa Verde members and $5.00US for non-members (or the equivalent in any other currency). It is also possible to obtain endorsements for 50, 75, 100, and 150 countries. The price for each endorsement is $1.00US.

Applicants presenting evidence of having 150 DXCC countries valid for this award will receive it free, with all endorsements included.

Awards Issued

USA-CA 500: Si Spisak, NØDPF; Harry Ward, W6TPC; Robert J. Cyr, N1HHW.

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USA-CA 1500: Si Spisak, NØDPF; Harry Ward, W6TPC.

USA-CA 2000: Si Spisak, NØDPF; Harry Ward, W6TPC.

USA-CA 2500: Si Spisak, NØDPF; Harry Ward, W6TPC.

USA-CA 3000: Si Spisak, NØDPF; Harry Ward, W6TPC.

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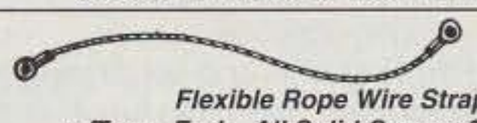

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BY FREDERICK O. MAIA, W5YI

WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

What You Need To Know About The New RF Safety Regulations

Beginning next month all new Amateur Service applicants must know about radiofrequency (RF) safety. It is a new examination topic that has never before been required. Effective July 1, 1997 the written examinations for Element 2 and Element 3A will contain questions on this subject. In fact, nearly 20 percent of the almost 1000 questions in the Novice and Technician question pools is on RF Safety! It also will not be long before *all* amateurs upgrading or renewing their license must certify on a new version of the Form 610 Amateur Radio application that they are familiar with and understand the FCC's rules regarding RF exposure.

What Is RF Radiation?

The electromagnetic spectrum. Amateur transmitters, like all radio transmitters, send information from one place to another by scattering electromagnetic waves into space. Electromagnetic radiation consists of waves of electric and magnetic energy moving together through space at the speed of light. The electromagnetic "spectrum" includes all of the various forms of electromagnetic radiation, ranging from extremely low frequency (ELF) signals (with very long wavelengths) to X-rays and gamma rays, which have very high frequencies and extremely short wavelengths. A wavelength is defined as the distance in meters between corresponding points of two successive electromagnetic waves at a specific frequency.

In between these extremes lie radio waves, microwaves, infrared radiation, visible light, and ultraviolet radiation. Radiofrequency (RF) electromagnetic fields (EMFs) can range from low frequency such as 60 Hz electric power-line frequency fields to microwave radio energy which is much higher in frequency. Magnetic fields are created whenever electric current is flowing. Power-line EMFs are produced when electric currents flow along a wire. The energy released by oscillating EMFs is called *electromagnetic radiation*, or *EMR*.

Most EMFs to which we are exposed are manmade, but some can also occur naturally, such as the magnetic field of the Earth itself and the electric fields associated with high-voltage lightning strikes. Even static electricity caused by walking on a dry carpet and discharged when we touch a conductor has an associated EMF.

The principle of radio. Radio basically works by impressing intelligence on a radio wave, sending it into space, and separating the wanted information from the radio wave at the receiving end. Sometimes just starting and stopping the radio wave can convey information, such as in the case of Morse code.

Different wavelengths can travel, or propagate, in different ways. The signal is called a radiofrequency, or RF, wave if it has the ability to travel great distances through space. An audio frequency is one that you can hear—generally in the 10 cycle to 20 thousand cycle, or Hertz, range. They cannot travel very far from their source. The radio frequencies lie just above the audio range.

Radio waves can heat tissue. Microwave radiation is a form of RF radiation which occupies the upper part of the RF electromagnetic spectrum above 300 megaHertz. The most familiar use of microwave radiation is in household microwave ovens, which rely on the principle that microwaves generate heat throughout an object rather than just at the surface. Therefore, microwave ovens can cook food more rapidly than conventional ovens. Strict manufacturing safety rules apply to microwave ovens to ensure that the RF energy stays inside the appliance.

Another use of microwaves is for the transmission of radio signals. Many uses have been developed for RF energy, but carrying telecommunications is the most common use.

Non-ionizing radiation. The energy associated with electromagnetic radiation depends on its frequency (or wavelength)—the greater the frequency (and shorter the wavelength), the higher the energy. Therefore, solar radiation, X-rays, and gamma rays, which have extremely high frequencies, have relatively large amounts of energy. At the other end of the electromagnetic spectrum, Extremely Low Frequency (ELF) radiation is far less energetic.

Of the various forms of electromagnetic radiation, X-ray radiation and gamma radiation represent the greatest relative hazard because of their greater energy content and correspondingly greater potential for damage. Nuclear weapons, for example, produce enormous amounts of ionizing radiation. In fact, X-rays and gamma rays are so energetic that they can cause ionization of atoms and molecules, and thus are classified as "ionizing" radiation. Ionization is a process by which electrons are stripped from atoms and molecules, producing molecular changes that can lead to significant genetic chromosome damage in biological tissue. It can actually break apart DNA, the building blocks that make up our genes.

Less energetic forms of electromagnetic radiation, such as low-frequency and RF radiation, lack the ability to ionize atoms and molecules and are classified as "non-ionizing" radiation. Their frequency is too low to produce enough photon energy to ionize atoms. Ionizing and non-ionizing radiation are separated on the electromagnetic spectrum by visible light. Thus, the frequency of non-ionizing EMR extends from the very low frequencies (VLF) to the infrared region.

Measuring RF Radiation

Volts and amps per meter. Since radiofrequency radiation has both an electric and a magnetic component, it is often convenient to express intensity of a radiation field in terms of units specific to each component. The unit "volts per meter" (V/m) is used for the electric component, and the unit "amperes per meter" (A/m) is used for the magnetic component. We often speak of an electromagnetic "field," and these units are used to provide information about the levels of the electric and magnetic "field strength" at a measurement location.

Power density. Another commonly used unit for characterizing an RF electromagnetic field is *power density.* Power density is defined as the magnitude of the electromagnetic energy as a point in space measured in power per unit of area. Power density is most accurately used when the point of measurement is far enough away from the RF emitter to be located in what is referred to as the "far field" zone of the radiation pattern. In closer proximity to the transmitter is the "near field." It is best to use electric and magnetic field strength readings in the near field.

Power density is usually measured in milliwatts per square centimeter (mW/cm^2). When speaking of frequencies in the microwave and higher range, power density is usually used to express intensity since exposures that might occur would likely be in the far field.

Health Effects of RF Exposure

Heating of the human body. During recent years the public and the news media have been increasingly concerned about the dangers of electromagnetic fields (EMFs) and non-ionizing radiation. It has been known for some time that high intensities of RF radiation can be harmful due to the ability of RF energy to heat biological tissue rapidly. This is the principle by which microwave ovens cook food and how low-power infrared lasers can burn through human tissue during surgery. Exposure to RF power densities on the order of 100 milliwatts per square centimeter (mW/cm^2) or more can result in heating of the human body and an increase in body temperature.

Two possible harmful effects are RF burns and excessive RF exposure. RF burns occur when a person touches a live antenna or feed line that has high power going through it. This is similar to being burned by touching a stove, except the burn is deeper. Excessive RF exposure occurs when a person is too close to an antenna that is transmitting at high power. The higher the power, the more precautions should be taken.

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101 (817-461-6443)

Say You Saw It In CQ

Absorption of RF energy. In addition to intensity, the electromagnetic frequency of RF radiation is important in determining the relative hazard. At a distance of several wavelengths from a source of radiation, the human body will absorb RF energy at a maximum rate when the frequency of the radiation is between about 30 and 300 megaHertz. This includes the amateur 6 meter, 2 meter, and 1¼ meter bands. Because of this "resonance" phenomenon, the RF safety guidelines take this frequency dependence into account. Therefore, the most stringent standards are in this frequency range of maximum absorption.

Thermal effects of RF radiation. Tissue damage results primarily because of the body's inability to cope with or dissipate excessive heat. The extent of the heating depends on several factors, including the power level and frequency of the radiation, size of the person exposed, duration of exposure, and efficiency of heat dissipation.

If the power level is high enough, RF radiation can cause body heating, which can cause blindness or sterility. Always point your handheld transceiver as far away from your eyes as possible, since the eye lacks sufficient blood flow to dissipate any excessive heat load. The biological effects that result from heating of tissue by RF energy are often referred to as "thermal" effects.

As a rule, the thermal effects of RF energy are generally not a major concern for most radio amateurs or their neighbors, because of our relatively low power levels and the two-way (intermittent low duty cycle) nature of most transmissions. Very few amateurs operate their stations "key down" for extended periods of time.

Non-thermal effects of RF radiation. There have also been many reported low-energy-level "non-thermal" biological effects such as hearing disorders and immune system, neurological, reproductive, behavioral, and cancer-promoting consequences associated with RF exposure.

Statistical studies of radio operators and electrical utility workers have revealed a higher than normal incidence of leukemia and lymphatic and brain cancer. It has never been medically determined just what causes these "non-thermal" reactions, however.

There have even been instances where biological effects have been found at low levels of RF radiation—but not when the field is stronger. No conclusive and consistent data has yet been found which proves that exposures to residential levels of electric and magnetic fields pose a non-thermal human health hazard.

Amateur radio is essentially safe. In 1990 officials from the Federal Communications Commission and the Environmental Protection Agency conducted a field survey of typical amateur radio stations in southern California. The general conclusion was that the greater majority of amateur operations do not produce electromagnetic fields strong enough to cause a health hazard.

The levels of RF radiation routinely encountered by amateur radio operators are far below the levels necessary to produce significant heating and increased body temperature. However, there are certain isolated situations where the RF safety standards may be exceeded and people could be exposed to potentially harmful levels of RF radiation. Amateur radio is a hobby that can be pursued safely, provided a few simple precautions are followed.

New FCC Radiofrequency Safety Rules

Previous 1982 RF exposure guidelines. The Federal Communications Commission is responsible for licensing or authorizing most of the transmitting devices in the United States. The National Environmental Policy Act of 1969 (NEPA) requires agencies of the Federal Government to evaluate the effects of their actions on the quality of the human environment. One of several environmental factors addressed by these requirements is human exposure to RF energy emitted by FCC-regulated transmitters and facilities.

Since 1985 the Commission had been using the 1982 RF protection guidelines recommended by the American National Standards Institute, a private organization that sets standards for industry. These ANSI guidelines incorporate data showing that the human body absorbs RF energy at some frequencies more efficiently than at others.

Many low-power devices—including those of the amateur service—were "categorically excluded" from RF safety evaluation based on calculations and measurement data indicating that they would not cause exposures in excess of the guidelines under normal and routine conditions of use.

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LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE

(A) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minutes)
0.3—3.0	614	1.63	(100)*	6
3.0–30	1842/f	4.89/f	(900/f2)*	6
30–300	61.4	0.163	1.0	6
300–1500	—	—	f/300	6
1500–100,000	—	—	5	6

f = frequency in MHz
** = Plane-wave equivalent power density*

(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Strength (V/m)	Field Strength (A/m)	Magnetic Field Power Density (mW/cm^2)	Averaging Time (minutes)
0.3–1.34	614	1.63	(100)*	30
1.34–30	824/f	2.19/f	(180/f2)*	30
30–300	27.5	0.073	0.2	30
300–1500	—	—	f/1500	30
1500–100,000	—	—	1.0	30

f = frequency in MHz
** = Plane-wave equivalent power density*

Note 1– Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

Note 2– General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Table I– Limits for Maximum Permissible Exposure (MPE).

New 1992 RF exposure guidelines. The generally recognized body that sets EMR standards is the American National Standards Institute. Their guidelines have been lowered several times over the years. In response to new health and safety information, ANSI adopted their most recent RF exposure standard in 1992, designated ANSI/IEEE C95.1-1992, to replace its 1982 standard. This new standard contains a number of points significantly different from the 1982 ANSI standard. In some respects, the 1992 ANSI/IEEE standard is more restrictive in the amount of environmental RF exposure permitted, although for some situations recommended Maximum Permissible Exposure (MPE) levels are similar to the 1982 limits. The 1992 ANSI/IEEE standard also extends the frequency range under consideration to cover frequencies from 3 kHz to 300 GHz.

The 1992 ANSI standard is generally more stringent than the 1982 standard in the evaluation of low-power devices, such as hand-held radios. That is, the 1982 ANSI standard permitted exclusion from compliance with the MPE limits if the input power of the radiating device at frequencies between 300 kHz and 1 GHz was 7 watts or less. The 1992 ANSI/IEEE standard prohibits the application of the power exclusion to hand-held devices where the radiating structure is maintained less than 2.5 centimeters (cm) from the body of the user.

On April 8, 1993 the FCC released a Notice of Proposed Rulemaking (ET Docket 93-62), saying that it intended to develop a new set of RF exposure guidelines for all services based on the new 1992 ANSI/IEEE standard. The proposal set new Maximum Permissible Exposure (MPE) limits for electric and magnetic field strength and power density for transmitters operating at frequencies from 300 kHz to 100 GHz.

As part of the Telecommunications Act of 1996 signed into law by President Clinton in February 1996, the FCC was ordered by Congress to complete its work on revisions to the RF-exposure regulations within six months. The FCC adopted the new guidelines on August 1, 1996. A transition period was established, and most radio services had to comply with new requirements regulating human exposure to RF radiated fields beginning September 1, 1997. The amateur service has until January 1, 1998 to comply.

Even then, many health experts questioned whether the newest guidelines are adequate to protect public health since they apply only to RF energy and not low-power line frequencies. There is no generally accepted standard in America for exposure to the low-frequency fields produced by power lines or home appliances.

Controlled and uncontrolled exposures. The 1992 ANSI/IEEE standard specifies two tiers of exposure criteria—one tier for "controlled environments" (usually involving workers) and another, more stringent tier for "uncontrolled environments" (usually involving the general public). The 1982 ANSI standard specified only one set of exposure limits, regardless of whether the individual exposed was a worker or a member of the general public.

"Controlled environments" involve people who are aware of the RF safety risk, while the more stringent "uncontrolled environment" applies to people who have no control over their exposure. Since amateur radio installations are usually located in residential environments, they can be both in a "controlled" and "uncontrolled environment."

The FCC ruled that the "controlled" exposure limits would not only apply to occupational workers, but also to amateur radio operators and members of their immediate household. The "uncontrolled" RF exposure limits apply to the general public. In the case of amateur radio installations, this means that neighboring residences are in an "uncontrolled" environment and the more strict rules apply. The regulations require amateurs to evaluate their stations for controlled and uncontrolled exposure areas.

Most amateur transmissions are back-and-forth, two-way communications. Therefore, a station is normally only transmitting about half of the time—or a 50% duty cycle. The "controlled" and "uncontrolled" RF exposure limits are time-averaged over 6 and 30 minute time periods. It is thus permissible to exceed the recommended limits as long as the average exposure over the time period does not exceed the limits. The premise of time averaging is that the human body can regulate the thermal load caused by high localized RF exposures for short periods of time.

Maximum Permissible Exposure (MPE). The new Maximum Permissible Exposure (MPE) requirements were given in a table contained in FCC Rule Section 1.1310. This table (which is not part of the amateur rules) indicates MPEs for radiated electric fields, magnetic fields, and power density by frequency band. Section 1.1310 reads as follows:

§1.1310 Radiofrequency radiation exposure limits.

The criteria listed in Table I shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation . . . Further information on evaluating compliance with these limits can be found in the FCC's OST/OET Bulletin Number 65, "Evaluating Compliance with FCC-Specified Guidelines for Human Exposure to Radiofrequency Radiation."

These limits are generally based on recommended exposure guidelines published by the National Council on Radiation Protection and Measurements (NCRP) in "Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields," copyright NCRP, 1986. In the frequency range from 100 MHz to 1500 MHz, exposure limits for field strength and power density are also generally based on guidelines recommended by the American National Standards Institute (ANSI) in Section 4.1 of "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz," ANSI/IEEE C95.1-1992, copyright 1992 by the

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MPEs assume continuous-duty and operation. The regulations, however, allow amateurs to average the total power over 6 minutes for controlled environments and 30 minutes for uncontrolled environments. This average considers both the duty factor of the operating mode and the actual on-and-off times over the worst-case averaging period.

Amateur Radio and The New Standards

Amateur stations can legally transmit with up to 1500 watts on many bands throughout the radio spectrum using a wide variety of emissions—some, such as FM and RTTY, with high duty cycles. While most amateur stations transmit for short periods of time at power levels considerably lower than the maximum allowed, the possibility still exists for human exposures to RF radiation to be in excess of the new guidelines. Therefore, the blanket RF safety evaluation exemption that previously applied to the amateur service was lifted. Amateurs were given until January 1, 1998 to comply with the new rules.

This means that effective January 1, 1998 amateur radio stations will no longer be categorically exempt from complying with the FCC's RF safety standards. The standards for RF safety that amateurs (and other FCC licensees) will be required to meet are a combination of the 1992 ANSI/IEEE standards and somewhat stricter standards developed by the National Council for Radiation Protection and Measurement (NCRP). The standards establish limits for human exposure to RF fields; the permissible field strength and power density varies by frequency.

The most stringent power density allowed is in the 30–300 MHz VHF range, where a maximum "controlled environment" exposure limit of 1.0 milliwatt per square centimeter is permitted averaged over a 6 minute time period. A power density of 0.2 of a milliwatt per square centimeter is the maximum permitted in "uncontrolled environments" averaged over a 30-minute time period. Amateurs and their families come under the "controlled" guidelines, while a neighbor's residence falls under the stricter "uncontrolled" tier.

All amateur transmitters fall under the new rules regardless of power, operating mode, or station configuration. However, the FCC assumes that certain stations are safe without a formal evaluation. Those are base-station amateur stations radiating less than 50 W PEP at the transmitter output and push-to-talk handheld, mobile, or portable transceivers.

Amateurs radiating more than 50 watts output are required to evaluate their station parameters (including power output, antenna gain, frequency, distance from the antenna to the populated environment, and duty-cycle of the communications) to assure that the MPE is not exceeded.

At press time the FCC was in the process of publishing a guide booklet with charts and tables to assist amateurs in determining if their stations comply with the new guidelines. There will be examples showing safe distances from typical antennas at different frequency bands and power levels.

Most amateur stations already meet the MPE limits described in the guidelines, especially when you consider the time-averaging aspect. Most amateurs need only to perform a "routine analysis" of their station operation, which can be done merely by comparing their station configuration to a similar station shown in a chart.

Most amateurs will not need to make any technical adjustments whatsoever. A survey of amateur stations in southern California conducted by the FCC in 1990 concluded that very few stations would normally exceed the new RF exposure guidelines. Assuming a 50% duty cycle, even a transmitter running a kilowatt into a three-element triband (14, 21, and 28 MHz) Yagi antenna need only be 35 to 40 feet from a neighbor's residence to comply with the new RF safety standards.

The new Part 97 Rules. There is no special amateur station evaluation paperwork that needs to be sent to the FCC to prove that you have completed the required RF exposure evaluation. Only a short statement, included on a new soon-to-be-released version of the FCC Form 610 station application, needs to be signed certifying that the amateur has read and understands the new RF exposure guidelines. This form is submitted when you qualify for a new license or renew your current one. The FCC does recommend, however, that each amateur keep a record of the station evaluation procedure in his or her station records in case a question arises.

Part 97, Amateur Radio Service

A new Section 97.13(c) has been added to the rules. It reads as follows:

§ 97.13 Restrictions on station location.

(c) Before causing or allowing an amateur station to transmit from any place where the operation of the station could cause human exposure to levels of radiofrequency (RF) radiation in excess of that allowed under §1.1310 of this chapter, the licensee is required to take certain actions. A routine RF radiation evaluation, as discussed in §1.1307(b) of this chapter, is required if the transmitter power exceeds 50 watts peak envelope power; otherwise the operation is categorically excluded from routine RF radiation evaluation except as specified in §1.1307© and §1.1307(d) of this chapter. Where the routine evaluation indicates that the RF radiation could be in excess of the limits contained in §1.1310 of this chapter, the licensee must take action to prevent such an occurrence. Further information on evaluating compliance with these limits can be found in the FCC's OST/OET Bulletin Number 65, "Evaluation Compliance with FCC-Specified Guidelines for Human Exposure to Radiofrequency Radiation."

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CIRCLE 121 ON READER SERVICE CARD

New RF safety examination questions. The new Part 97 rules add five questions each on a new tenth examination topic entitled *Radiofrequency Environmental Safety Practices* to each amateur radio license examination for the Novice, Technician, and General class licenses. The new RF safety questions will begin appearing in Novice (Element 2) and Technician (Element 3A) examinations on July 1, 1997. The new General Class RF safety questions are scheduled to be implemented on July 1, 1998. The exact questions that might appear in a written examination are widely available and can be found in various study manuals, such as in the Gordon West series. (Call 1-800-669-9594 if you need a copy of the new Novice/Technician RF Safety questions.)

Complying with the new guidelines. The FCC will now rely upon amateur licensees to demonstrate their knowledge of the new RF exposure guidelines through license examinations and certifying that they have read and understand the RF safety rules when applying for or renewing their station license.

While the new RF protection guidelines apply to all transmitters and power levels, a formal RF safety evaluation is not required to be made unless the station radiates more than 50 watts output power. Amateur stations must come into compliance with the new RF guidelines effective January 1, 1998. That means steps must be taken to ensure that your base station does not exceed the new RF safety guidelines. Hand-held, mobile, and portable transceivers are excluded from the requirement to perform a formal RF safety evaluation.

Determining RF field strengths. The new RF safety guidelines require amateur operators, whose stations are not categorically excluded, to perform a routine compliance analysis if their stations. The FCC is relying on amateur radio operators to perform this evaluation.

It is not easy to accurately measure RF field strengths in the environment. There are basically three ways to determine if your station exceeds the maximum permissible exposure levels. They are:

1. Using electronic instruments that measure field strength;

2. Performing mathematical calculations based on generic formulas provided by the FCC; and

3. Using tabular charts and computer programs which determine "worst case" estimated distances between typical transmitting antenna systems and the neighboring environment.

Each system has its short-coming. Professional RF power density meters are very expensive and relatively complex to accurately use, especially in the near field. Low-cost meters for home use are often inaccurate. Field strengths calculated using mathematical formulas fail to take into account the random hot spots that often exist in the near field. And charts and computer programs intentionally overstate the actual RF energy.

It is expected that most amateurs will adopt this third method, since it is the least expensive and easiest to use. The theory is that if your station can pass the "worst case" test, then it complies with the RF exposure guidelines. You may begin operating as soon as you determine that your station complies. There's no need for FCC approval before operating and no records to submit.

In short, there is no universal consensus about safe energy levels, and even if there were, electromagnetic radiation is difficult to measure. One of the best ways to deal with RF energy is to minimize the potential health hazards as much as possible.

Minimizing exposure to RF radiation. Are the electromagnetic fields generated by power lines, broadcast stations, televisions, amateur radio gear, and hundreds of other devices bathing us in damaging radiation? The jury is still out, but you can take steps to protect yourself and your neighbors from danger, both real and potential.

Amateurs should follow a practice of "prudent avoidance"—that is, minimize exposure to RF energy whenever it is practical to do so. This is also the policy that has been adopted by the American Radio Relay League. Some amateur operating practices are safer than others. Here are some suggestions.

- You should radiate as little RF power as possible. The power-level regulations have always required amateurs to use the least amount of transmitter power necessary to perform their communications.
- Make it a practice to operate without your linear amplifier whenever possible!
- Never use an amplifier that has its shielded metal cover removed. The cover keeps RF energy from escaping into the environment.
- Reduce the duty cycle. Keep transmissions short, especially when operating at the VHF/UHF/microwave level.
- Transmitting antennas should be mounted as far away from residences and populated areas as possible, and the higher the antenna the better.
- Since feed lines can radiate, route open-wire line (or even coaxial cable if the standing wave ratio is high) away from populated areas.
- Do not transmit when people are near a ground-mounted or mobile antenna. Vertical antennas are best installed on monopoles, towers, or roofs and not at ground level.
- A good rule-of-thumb to follow is to allow at least 35 feet distance between the antenna and the environment if 100 watts or more is being transmitted. Allow even a greater distance if you transmit with high-gain antennas at the high-energy VHF/UHF frequencies!
- Don't transmit if anyone is within 5 or 6 feet of a whip antenna.
- Be careful when using indoor antennas, including those mounted in attics, because they can generate substantial RF fields.
- Use low power (10 watts output or less wherever possible), and keep your transmissions short when someone might be near the antenna.
- Do not use high-power VHF/UHF or microwave transmitters and high-gain directional antenna arrays such as used during moon-bounce or weak-signal communications in a residential environment.
- Never look into the open end of an activated waveguide or stand in front of a high-gain VHF-UHF antenna array when the transmitter is on.
- Always use the lowest power level possible when using a hand-held transceiver and point the antenna as far away from your head and especially the eyes as possible.
- Amateurs can also minimize the amount of RF energy radiated into the surrounding environment by changing frequency bands and using lower duty cycle emission types such as single sideband and CW.

73, Fred, W5YI

BY GEORGE JACOBS, W3ASK

PROPAGATION

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Sunspot Cycle Update

The Royal Observatory of Belgium reports a mean sunspot number of 7.6 for February 1997. A high value of 31 was reported for February 4th. There were 13 days during the month when the sun was absolutely spotless.

February's mean value results in a 12-month running smoothed sunspot number of 9 centered on August 1996. The new sunspot cycle has remained at this smoothed level for the first three months of its life. There is wide disagreement among the world's experts as to what level of sunspot count can be expected for June 1997. The Royal Observatory of Belgium is predicting a smoothed number of 16. The National Geophysical Data Center in Boulder, Colorado is calling for a count of 10, while NOAA's Space Environment Center, also in Boulder, is predicting a level of 40!

There is now agreement among the experts that a new sunspot cycle has begun and is now on the rise. How fast Cycle 23 is rising, however, remains to be seen.

The Dominion Radio Astrophysical Observatory at Penticton, British Columbia reports a mean value of 74 for the February 1997 10.7 cm solar flux level. This results in a smoothed value of 72 centered on August 1996. A level in the high 70s to low 80s is expected during June 1997.

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for June 1997

	Expected Signal Quality			
Propagation Index.....	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 2, 10, 22, 27, 30	A	A	B	C
High Normal: 1, 3, 7-8, 13, 21, 23, 26, 28-29	A	B	C	C-D
Low Normal: 4, 6, 9, 11-12, 14-16, 19-20, 24-25	B	C-B	D	D-E
Below Normal: 5, 17	C	C-D	D-E	E
Disturbed: 18	C-D	D	E	E

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S9 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. **Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.**
2. **With the *propagation index,* use the above table to find the expected signal quality associated with the band opening for any date of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good (B) on June 1st, Excellent (A) on the 2nd, good (B) on the 3rd, fair-to-good (C-B) on the 4th, fair-to-poor (C-D) on the 5th, etc.**

W3ASK Recipient of NAB Engineering Achievement Award

In April George Jacobs was awarded the National Association of Broadcasters prestigious Radio Engineering Achievement Award in recognition of more than a half century of leadership in broadcast engineering. This year marks George's 56th year in broadcast engineering, first for nearly 40 years in government service, retiring with the rank of Senior Federal Executive in 1980, and then as head of his own consulting engineering organization specializing in international broadcasting.

George is credited with pioneering and developing the Voice of America, and the post 1974 modernization of Radio Free Europe and Radio Liberty broadcasting facilities. He has represented the US at almost every major broadcasting conference convened by the International Telecommunication Union since 1949. Since his retirement from government service George has been responsible for the conceptual design, regulatory application, and frequency management of some of the world's most powerful, privately owned shortwave broadcast facilities. He is also involved in the development of OPEN RADIO in Moscow.

This year marks George's 46th year as Propagation Editor of *CQ*. We at CQ congratulate him on his achievements and on his receiving this prestigious award.

Salting The Ionosphere

It is time again for me to plan my annual "salting the ionosphere" pilgrimage. Usually I go to places where physical or natural conditions are conducive for symbolically asking Mother Nature to "salt the ionosphere" so that good propagation conditions will occur during the annual *CQ* World-Wide DX Contest periods. As unscientific as this may sound, it seems to have produced favorable results during the past six contest periods, and last year's really paid off. Our hocus pocus in Nova Scotia resulted in conditions during the 1996 WW DX Contest weekends being among the best of the year! Since it worked out so well in "New Scotland," this year I plan to "salt the ionosphere" in bonnie Old Scotland. I will be carrying my salt bags there during early July.

June Propagation

Compared to last June, expect an improvement in propagation conditions on the HF bands.

Twenty meters looks like it will continue to be the best band for DX propagation conditions during June. It should open shortly after sunrise and remain open for several hours in almost all directions. When conditions are Low Normal or better, look for good openings to Europe, Central and South America, the South Pacific, Australasia, and the Far East before noon-time absorption sets in and weakens DX signals. A second, and usually stronger, peak is expected during the afternoon and early evening hours when good conditions should be possible towards Europe, Africa, Central and South America, and the Middle East. Later in the evening, and until midnight, expect good openings to South America, Antarctica, the South Pacific, Australasia, and the Far East.

Not much DX is expected on 15 or 17 meters until after noon, although some openings should be possible towards Central and South America. After noon the band should open occasionally from the eastern half of the country towards Africa and possibly Europe, and Central and South America, and from the western half towards the South Pacific, Australasia, the Far East, and Central and South America. Best time to check for these DX openings is during the late afternoon hours, particularly when conditions are expected to be High Normal or better.

Few DX openings are expected on 10 or 12 meters, but a number should be possible to the Caribbean and Central America via sporadic-*E* propagation. Longer openings into South America, and possibly to southern Africa and the South Pacific, may also be possible during the late afternoon hours, particularly when conditions are High Normal or better.

Longer hours of daylight and seasonally higher levels of static should reduce considerably the chances for DX openings on 40, 80, and 160 meters. Some fairly good openings, however, are forecast to several areas of the world for 30 and 40 meters during the hours of darkness and the sunset and sunrise periods. Similar openings, but usually with weaker signals, should often be possible on 80 meters during the hours of darkness. An occasional DX opening may also be possible on 160 meters during the nighttime hours.

Plenty of good short-skip openings are expected on the HF bands during the month. For distances less than 250 miles try 80 meters during the day and 160 meters at night. For openings between 250 and 750 miles, 40 and 30 meters should be best during the day and 80 meters at night. For openings beyond 750 miles, 20 meters should be optimum during the day and 30 and 40 meters at night. Frequent short-skip, sporadic-*E* type openings are also expected on 10, 12, 15, and 17 meters over distances between approximately 600 and 1300 miles. Fifteen meters should occasionally open over longer distances during the late afternoon.

VHF Ionospheric Openings

In the northern hemisphere, sporadic-*E* ionization usually reaches peak intensity during June, and some good 6 meter openings should be possible over a range of approximately 1000 to 1400 miles. During periods of intense and widespread ionization, two-hop 6 meter openings

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HOW TO USE THE DX PROPAGATION CHARTS

1. Use chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4, and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9, and 0 areas; the Western USA Chart in the 6 and 7 areas; and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular DX region, as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings.

3. The propagation index is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of days during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

4. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate *daylight* time is used, not GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts CW, or 1 kw, PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

6. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept of Commerce, Boulder, Colorado 80302.

June 15–August 15, 1997
Time Zone: EDT (24-Hour Time)
EASTERN USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Western & Central Europe & North Africa	13-18 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-17 (3) 17-18 (4) 18-19 (3) 19-20 (2) 20-22 (1)	19-21 (1) 21-22 (2) 22-00 (3) 00-01 (2) 01-02 (1)	21-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)*
Northern & Eastern Europe	*Nil*	06-07 (1) 07-09 (2) 09-15 (1) 15-18 (2) 18-19 (3) 19-22 (2) 22-00 (1)	20-21 (1) 21-23 (2) 23-00 (1)	21-23 (1)
Eastern Mediter-ranean & Middle East	11-13 (1) 16-17 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-22 (1) 22-00 (2) 00-06 (1) 06-08 (2) 08-09 (1)	20-22 (1) 22-00 (2) 00-01 (1)	22-00 (1)
Western Africa	11-14 (1) 14-17 (2) 17-18 (1)	05-06 (1) 06-07 (2) 07-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-23 (2) 23-01 (1)	20-22 (1) 22-01 (2) 01-02 (1)	21-01 (1)
Eastern & Central Africa	11-16 (1)	16-18 (1) 18-20 (2) 20-21 (1)	22-00 (1)	22-00 (1)
Southern Africa	11-13 (1)	01-03 (1) 05-07 (1) 15-16 (1) 16-18 (2) 18-19 (1)	20-21 (1) 21-01 (2) 01-02 (1)	22-01 (1)* 23-01 (1)*
Central & South Asia	*Nil*	07-10 (1) 20-23 (1)	05-07 (1) 20-22 (1)	*Nil*
Southeast Asia	*Nil*	07-10 (1) 19-23 (1)	*Nil*	*Nil*
Far East	*Nil*	07-08 (1) 08-10 (2) 10-12 (1) 20-23 (1)	04-06 (1)	*Nil*
South Pacific & New Zealand	19-22 (1)	19-21 (1) 21-01 (2) 01-07 (1) 07-10 (2) 10-12 (1)	02-03 (1) 03-06 (2) 06-07 (1)	03-06 (1) 03-05 (1)*
Australasia	19-22 (1)	06-08 (1) 08-09 (2) 09-12 (1) 17-19 (1) 21-23 (1) 23-01 (2) 01-04 (1)	03-04 (1) 04-06 (2) 06-07 (1)	03-06 (1)
Caribbean, Central America & Northern Countries of South America	15-17 (1)** 09-12 (1) 12-15 (2) 15-18 (3) 18-20 (2) 20-21 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-12 (3) 12-16 (2) 16-18 (3) 18-21 (4) 21-23 (3) 23-00 (2) 00-02 (1)	20-22 (1) 22-23 (2) 23-03 (3) 03-05 (2) 05-07 (1)	22-00 (1) 00-04 (2) 04-06 (1) 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	14-17 (1)** 09-12 (1) 12-15 (2) 15-17 (3) 17-19 (2) 19-20 (1)	06-08 (1) 08-09 (2) 09-15 (1) 15-17 (2) 17-19 (3) 19-20 (4) 20-22 (3) 22-00 (2) 00-04 (1)	21-23 (1) 23-03 (2) 03-06 (1)	00-05 (1) 01-04 (1)*
McMurdo Sound, Antarctica	*Nil*	20-22 (1) 22-00 (2) 00-02 (1)	00-03 (1) 03-06 (2) 06-07 (1)	03-06 (1)

June 15–August 15, 1997
Time Zones: CDT & MDT
(24-Hour Time)
CENTRAL USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Western & Southern Europe & North Africa	13-17 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-21 (1)	20-22 (1) 22-00 (2) 00-02 (1)	21-00 (1)
Northern & Eastern Europe	*Nil*	06-07 (1) 07-09 (2) 09-14 (1) 14-17 (2) 17-20 (1) 20-22 (2) 22-23 (1)	20-23 (1)	21-23 (1)
Eastern Mediter-ranean & Middle East	*Nil*	07-09 (1) 14-15 (1) 15-17 (2) 17-19 (1) 19-21 (2) 21-22 (1)	20-23 (1)	*Nil*
Western Africa	14-16 (1)	06-08 (1) 13-15 (1) 15-17 (2) 17-18 (3) 18-19 (2) 19-21 (1)	20-00 (1)	21-23 (1)
Eastern & Central Africa	*Nil*	16-18 (1) 18-20 (2) 20-21 (1)	20-23 (1)	*Nil*
Southern Africa	10-12 (1)	05-07 (1) 14-15 (1) 15-17 (2) 17-18 (1) 22-00 (1)	21-23 (1) 23-00 (2) 00-01 (1)	22-00 (1)
Central & South Asia	*Nil*	09-11 (1) 18-20 (1) 20-22 (2) 22-00 (1)	05-07 (1) 19-21 (1)	*Nil*
Southeast Asia	19-21 (1)	08-10 (1) 20-21 (1) 21-23 (2) 23-00 (1)	05-07 (1)	*Nil*
Far East	20-22 (1)	07-08 (1) 08-11 (2) 11-21 (1) 21-23 (2) 23-01 (1)	04-07 (1)	04-06 (1)
South Pacific & New Zealand	15-19 (1) 19-21 (2) 21-22 (1)	17-19 (1) 19-22 (2) 22-00 (3) 00-02 (2) 02-07 (1) 07-10 (2) 10-14 (1)	01-03 (1) 03-04 (2) 04-06 (3) 06-07 (2) 07-08 (1)	01-04 (1) 04-05 (2) 05-06 (1) 03-05 (1)*
Australasia	16-18 (1) 20-22 (1)	06-07 (1) 07-09 (2) 09-11 (1) 15-17 (1) 20-22 (1) 22-00 (3) 00-02 (2) 02-04 (1)	01-03 (1) 03-06 (2) 06-07 (1)	03-06 (1)
Caribbean, Central America & Northern Countries of South America	15-18 (1)** 09-13 (1) 13-15 (2) 15-18 (3) 18-19 (2) 19-20 (1)	06-07 (1) 07-08 (3) 08-10 (4) 10-12 (3) 12-16 (2) 16-18 (3) 18-20 (4) 20-22 (3) 22-00 (2) 00-02 (1)	20-22 (1) 22-23 (2) 23-03 (3) 03-05 (2) 05-06 (1)	22-00 (1) 00-04 (2) 04-05 (1) 00-04 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	14-17 (1)** 09-12 (1) 12-14 (2) 14-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-09 (2) 09-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-23 (2) 23-02 (1)	21-23 (1) 23-03 (2) 03-05 (1)	22-04 (1) 00-03 (1)*
McMurdo Sound, Antarctica	*Nil*	18-21 (1) 21-23 (2) 23-01 (1)	22-04 (1) 04-06 (2) 06-07 (1)	04-06 (1)

June 15–August 15, 1997
Time Zone: PDT (24-Hour Time)
WESTERN USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Western & Southern Europe & North Africa	*Nil*	06-07 (1) 07-08 (2) 08-14 (1) 14-17 (2) 17-19 (1) 22-00 (1)	20-23 (1)	*Nil*
Central, Northern & Eastern Europe	*Nil*	06-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-18 (1) 21-23 (1)	20-22 (1)	*Nil*
Eastern Mediter-ranean & Middle East	*Nil*	06-08 (1) 14-16 (1) 19-20 (1) 20-21 (2) 21-22 (1)	20-22 (1)	*Nil*
Western Africa	10-14 (1)	07-09 (1) 14-16 (1) 16-17 (2)	20-23 (1)	*Nil*

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		17-19 (3) 19-20 (2) 20-21 (1)		
Eastern & Central Africa	*Nil*	14-16 (1) 16-18 (2) 18-19 (1) 06-08 (1)	*Nil*	*Nil*
Southern Africa	*Nil*	06-08 (1) 13-16 (1) 22-00 (1)	20-21 (1) 21-22 (2) 22-23 (1)	20-22 (1)
Central & South Asia	*Nil*	07-08 (1) 08-10 (2) 10-11 (1) 18-20 (1) 20-22 (2) 22-23 (1)	05-07 (1) 18-20 (1)	*Nil*
Southeast Asia	19-23 (1)	07-09 (1) 09-11 (2) 11-12 (1) 21-23 (1) 23-01 (2) 01-03 (1)	03-05 (1) 05-06 (2) 06-07 (1)	04-06 (1)
Far East	14-16 (1) 20-23 (1)	07-10 (2) 10-13 (1) 21-23 (1) 23-00 (2) 00-02 (3) 02-04 (2) 04-07 (1)	02-03 (1) 03-04 (2) 04-05 (3) 05-06 (2) 06-07 (1)	03-06 (1)
South Pacific & New Zealand	13-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	02-07 (1) 07-10 (2) 10-16 (1) 16-18 (2) 18-19 (3) 19-22 (4) 00-02 (2)	23-01 (1) 01-02 (2) 02-06 (3) 06-07 (2) 07-08 (1)	00-02 (1) 02-06 (2) 06-07 (1) 02-05 (1)*
Australasia	15-18 (1) 18-21 (2) 21-22 (1)	19-21 (1) 21-22 (2) 22-00 (3) 00-01 (2) 01-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-16 (1)	00-01 (1) 01-04 (2) 04-06 (3) 06-07 (2) 07-08 (1)	02-05 (1) 05-06 (2) 06-07 (1) 04-06 (1)*
Caribbean, Central America & Northern Countries of South America	15-18 (1)** 10-13 (1) 13-15 (2) 15-18 (3) 18-19 (2) 19-20 (1)	06-07 (1) 07-10 (3) 10-15 (2) 15-18 (3) 18-21 (4) 21-22 (3) 22-23 (2) 23-02 (1)	19-21 (1) 21-22 (2) 22-03 (3) 03-05 (2) 05-06 (1)	20-21 (1) 21-03 (2) 03-05 (1) 23-04 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	12-16 (1)** 10-12 (1) 12-13 (2) 13-15 (3) 15-17 (2) 17-18 (1)	05-07 (1) 07-09 (2) 09-15 (1) 15-17 (2) 17-18 (3) 18-19 (4) 19-20 (3) 20-22 (2) 22-00 (1)	20-21 (1) 21-23 (2) 23-01 (1) 01-03 (2) 03-04 (1)	22-03 (1) 00-02 (1)*
McMurdo Sound, Antarctica	16-18 (1)	17-20 (1) 20-22 (2) 23-01 (1) 07-09 (1)	21-23 (1) 02-03 (1) 03-06 (2) 06-07 (1)	04-06 (1)

*Indicates best time for 160 meter openings.
**Indicates best time for 10 meter openings.
For 12 meter openings interpolate between 10 and 15 meter openings.
For 17 meter openings interpolate between 15 and 20 meter openings.
For 30 meter openings interpolate between 40 and 20 meter openings.

up to distances of about 2300 miles may also be possible.

An occasional sporadic-*E* opening on 2 meters may occur, particularly when ionization is very intense, over distances between approximately 1200 and 1400 miles.

While sporadic-*E* ionization can occur at any time, hence its name, it is more likely to take place during the mid-morning and again from late afternoon through early evening.

Here is a useful tip for predicting 6 meter short-skip openings from observations made on 10 meters. The geometry of propagation is such that as the skip distance decreases on 10 meters, the highest frequency that will be reflected by sporadic-*E* ionization *increases*. By observing the *minimum* skip heard on 10 meters, and using the relationship shown in fig. 1, it should be possible to tell whether or not 6 meters is open and over what distance.

For example, if the minimum skip heard on 10 meters in a southwesterly direction is observed to be 400 miles (it's the distance to the nearest skip station that counts, not others), from fig. 1 the intersection between 400 miles and the 10 meter curve corresponds to an MUF of 60 MHz. This means that there is a very good chance that 6 meters should also open in the same general direction. The minimum skip distance that can be expected on 6 meters can be found from fig. 1 by locating the intersection between 60 MHz and the 6 meter curve. The resulting distance is found to be 900 miles. A useful rule of thumb to remember is that when skip stations are heard less than 500 miles away on 10 meters, the chances are very good that 6 meters will also open in the same general direction.

For an excellent comprehensive review of sporadic-*E* propagation and how to predict it, see the following two articles that appear in *CQ*'s sister publication *CQ VHF*. Both articles were authored by Ken Neubeck, WB2AMU. They are "Predicting Sporadic-*E* Openings on 6 Meters," July 1996 issue, and "The Great Sporadic-E Debate Part 1—The Solar Connection," April 1997 issue.

Look for some meteor activity from June 8–10, which could increase the possibility for meteor-scatter-type openings on the VHF bands.

Check the "Last-Minute Forecast" at the beginning of this column for those days in June that are expected to be Below Normal or Disturbed on the HF bands. These are the days on which auroral and other types of ionospheric propagation may be possible on the VHF bands.

This month's *CQ* Propagation Charts contain DX predictions for the period June 15 through August 15, 1997. Short-skip charts for June, for openings between 50 and 2300 miles, and from Hawaii and Alaska, appeared in last month's column. 73, George, W3ASK

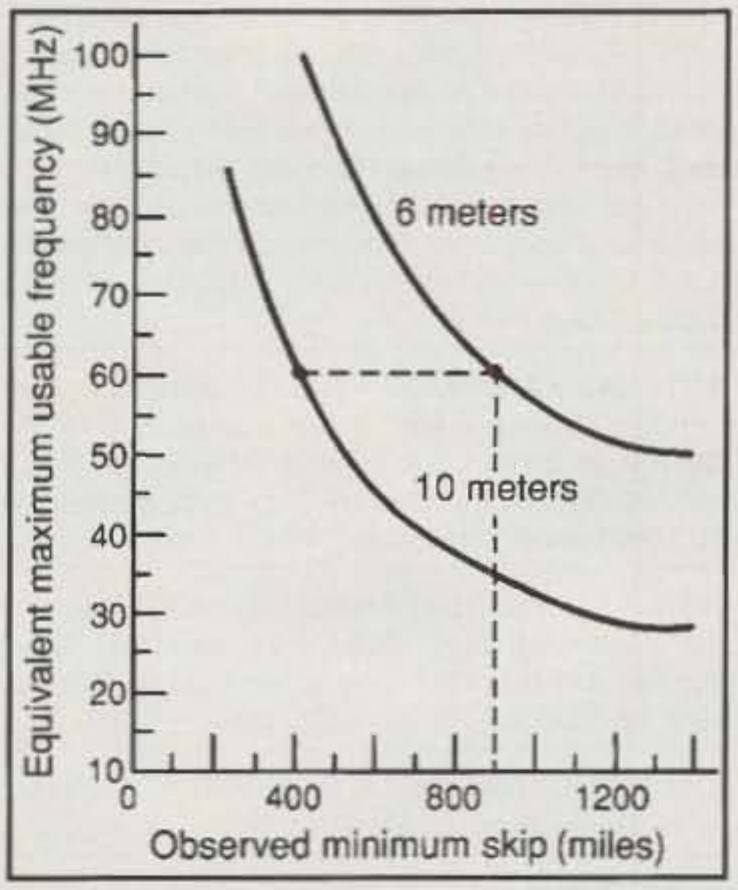

Fig. 1–A graph showing how to predict 6 meter short-skip openings.

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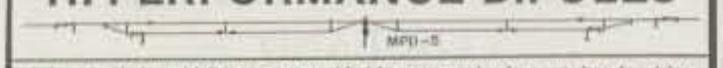

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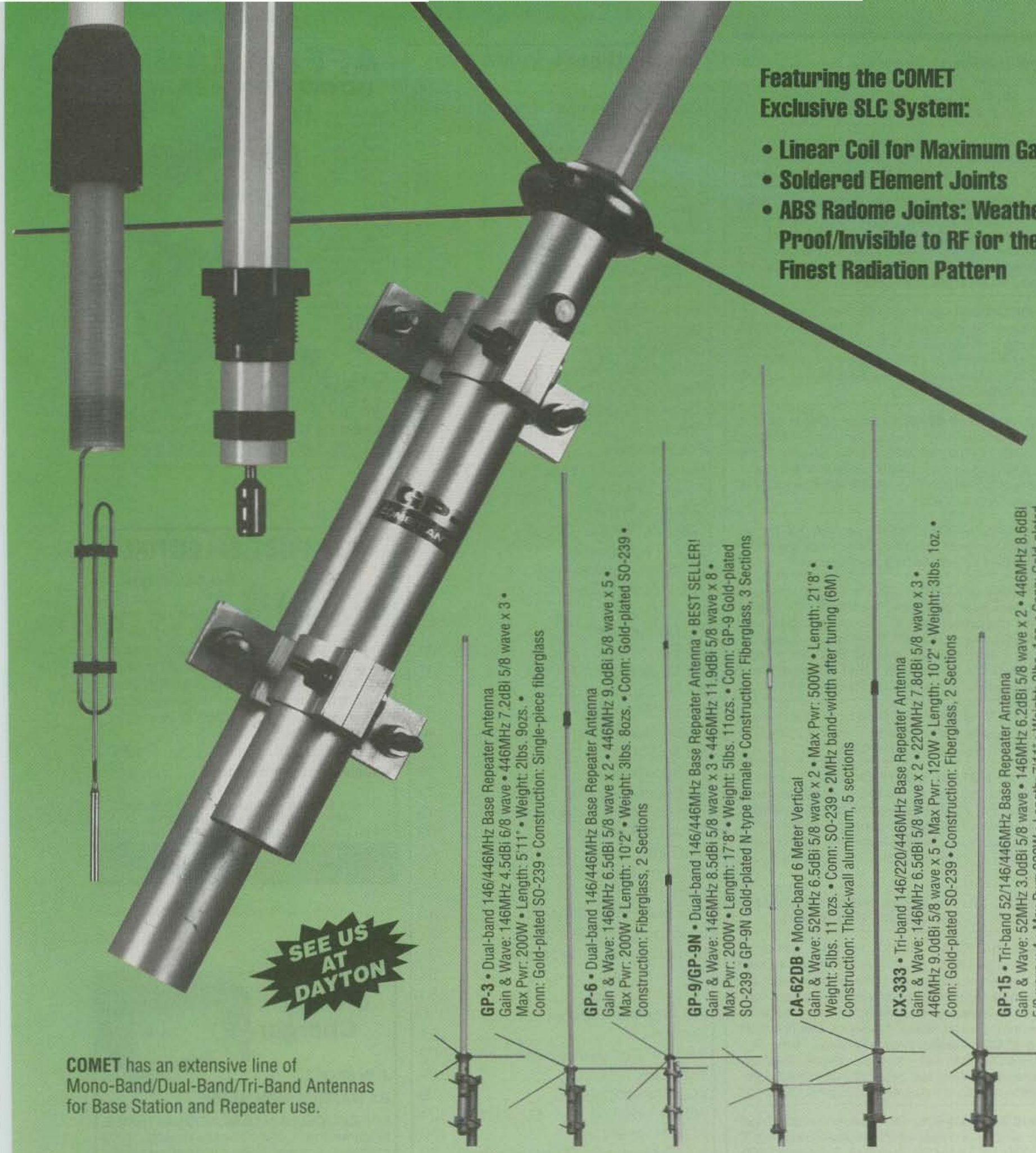

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446MHz 9.0dBi 5/8 wave x 5 • Max Pwr: 120W • Length: 10'2" • Weight: 3lbs. 1oz. •
Conn: Gold-plated SO-239 • Construction: Fiberglass, 2 Sections

GP-15 • Tri-band 52/146/446MHz Base Repeater Antenna
Gain & Wave: 52MHz 3.0dBi 5/8 wave • 146MHz 6.2dBi 5/8 wave x 2 • 446MHz 8.6dBi
5/8 wave x 4 • Max Pwr: 300W • Length: 7'11" • Weight: 3lbs. 1oz. • Conn: Gold-plated
SO-239 • 2MHz band-width after tuning (6M) • Construction: Single-piece fiberglass

SEE US AT DAYTON

COMET has an extensive line of Mono-Band/Dual-Band/Tri-Band Antennas for Base Station and Repeater use.

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"And with dual receive you can talk on one band, and listen on another!"

"Plus, the high-tech Enhanced Smart Search™ is great for finding repeaters --and you can watch it all on the dual display."

"Looks like Yaesu did it again!"

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Compact Dual Band Mobile

Now a dual-bander that remotes and is easy-to-use, without sacrificing the features you want!

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Yaesu's popular Omni-Glow™ display provides a wide field of view, and includes a DC voltage meter. Quickly program, or clone frequency memories with optional Windows™ PC programmable ADMS-2D.

"User-friendly" describes the streamlined front panel layout. Eight clearly-marked keys, and separate Volume/Squelch controls for each band, make operation easy. And the backlit DTMF microphone includes 3 user-programmable keys...but no awkward keypad cover!

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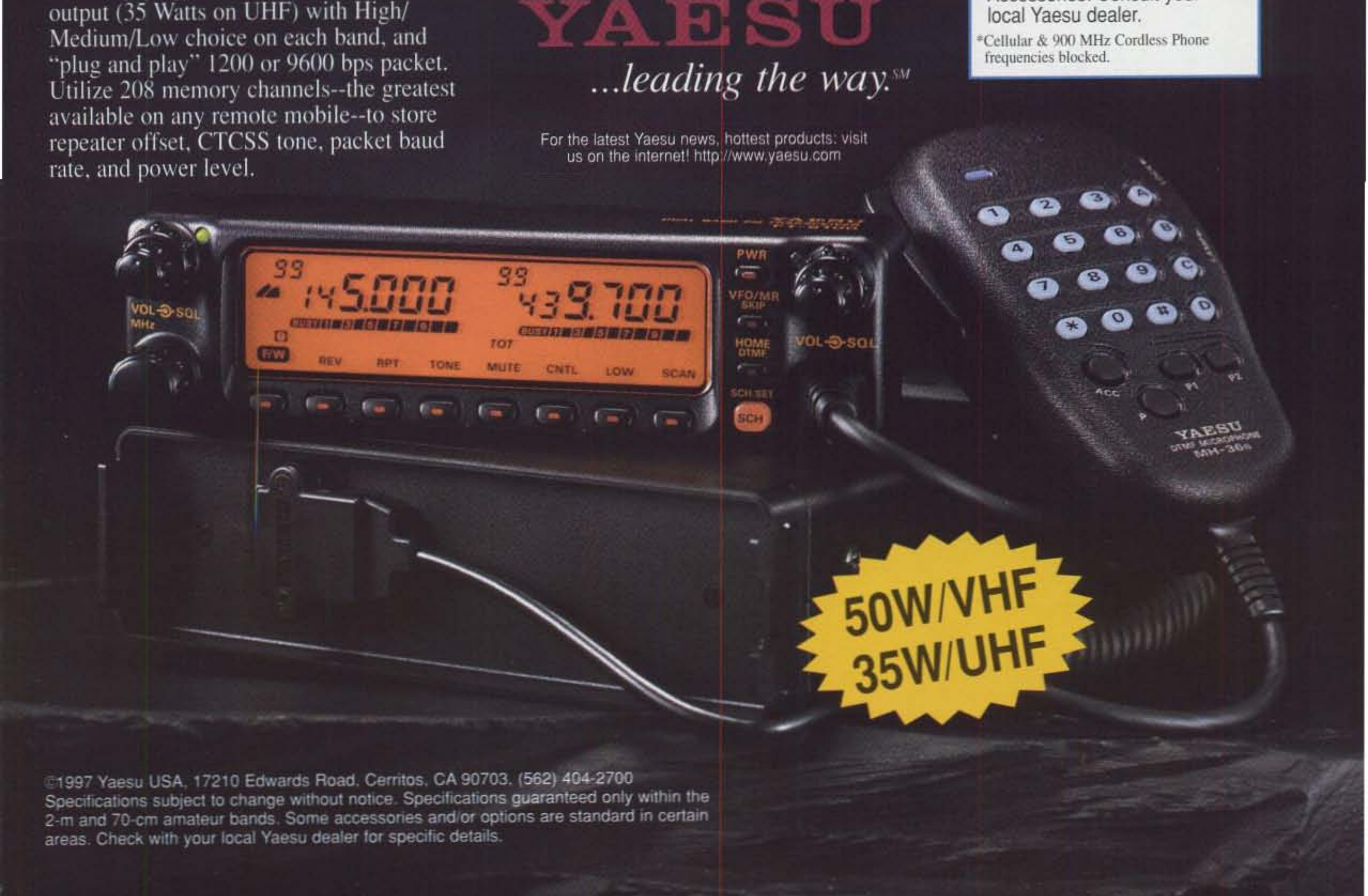
Features

- Frequency Coverage
  - RX: 110~550 MHz
  - 750~1300 MHz*
  - TX: 144~148 MHz
  - 430~450 MHz
- Detachable Front Panel (remotable w/optional YSK-8100)
- 3 Power Output Levels
  - 2m 50/20/5 Watt
  - 70cm 35/20/5 Watt
- 208 Memory Channels
- Enhanced Smart Search™
- CTCSS Encode
- Built-in Duplexer
- S-Meter Squelch
- Dual Receive (V+V,U+U,V+U)
- Crossband Repeat (bidirectional or one-way)
- PC Programmable w/optional ADMS-2D
- Digital Battery Voltage Display
- Auto Power Off (APO)
- Omni-Glow™ Display
- 1200/9600 bps Packet Compatible
- Alternating-Band Memory Selection (ABMS)
- DTMF Autodialer (6 Memories)
- Time Out Timer (TOT)
- Accessories: Consult your local Yaesu dealer.

*Cellular & 900 MHz Cordless Phone frequencies blocked.



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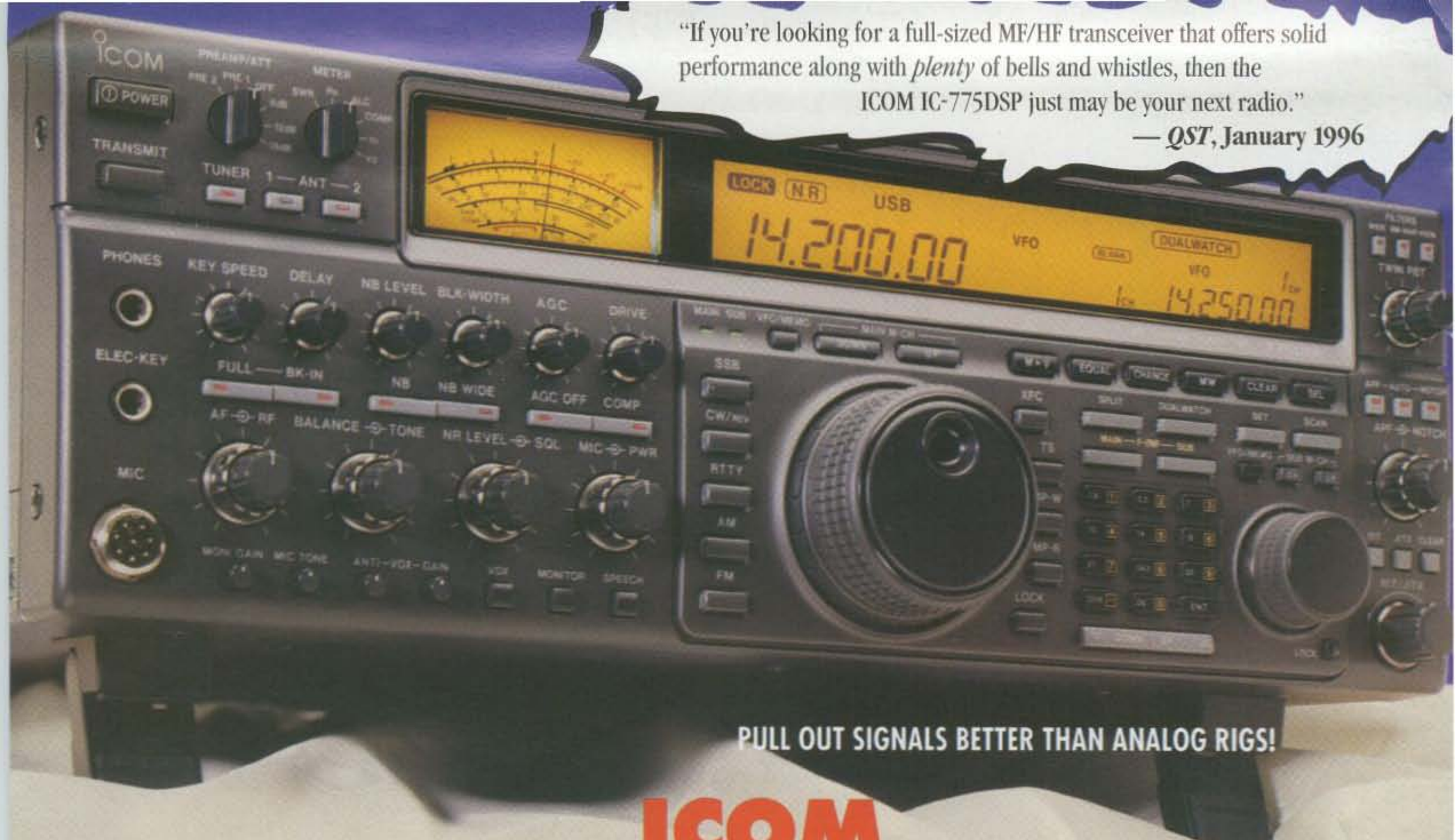
Specifications subject to change without notice. Specifications guaranteed only within the 2-m and 70-cm amateur bands. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.



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UNSURPASSED SIGNAL QUALITY!

Features you've only dreamed of:

- ICOM DSP on Transmit and Receive
- Noise Blanker/Manual Notch
- Twin Pass Band Tuning
- Dual Receive
- Built-In Automatic Antenna Tuner
- 200 Watt MOS FET PA with built-in Power Supply
- Digital Noise Reduction & Filtering:
  - Digital Low and High Pass Filters
  - Digital Modulation/Demodulation
  - Digital Automatic Notch
  - Digital Ultra-Narrow CW Filter
  - Digital Automatic APF (Audio Peak Filter)
- Rx 100 kHh -29.990 MHz
- New Single Crystal Control DDS
- RTTY/DATA Mode
- HF Packet Ready
- IF Notch
- APF (Audio Peak Filter)
- Quick-Split Function
- Memory CW Keyer
- CW Pitch Control & CW Reverse Mode
- Front and Back CW Key Jacks
- 1Hz Tuning and Display
- Large LCD with CFL Backlighting
- Triple Band Stacking Register
- 99 Memory Channels
- Front Panel Switch Control Dual Antenna System
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- Built-In Tone Encoder
- VOX
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- Noise Blanker with Adjustable Level and Width
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- RF Speech Compressor
- Optional SSB filters
- Optional Speech Synthesizer

Serious DX'ers require serious rigs. ICOM's IC-775DSP is engineered new from the ground up using Next Generation design and components, bringing unsurpassed signal quality to the discriminating DX'er. Pull out signals better than analog rigs can!

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CIRCLE 5 ON READER SERVICE CARD